ESTIMATION OF THE ECONOMIC COSTS AND CONSEQUENCES OF IMPLEMENTING THE PROPOSED REVISION TO REGULATION 308

FINAL REPORT

JULY 1990

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Jim Bradley, Minister/ministre

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Report Prepared by:
Hickling Management Consulting

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1.0 BACKGROUND AND PROJECT PURPOSE

In November of 1987, the Ontario Ministry of the Environment published a Green Paper which proposed numerous revisions to Regulation 308 of the Environmental Protection Act. The Ministry commissioned two studies to aid interested parties and its own organization to evaluate the proposed regulatory changes. These two studies were as follows:

- o the estimation of additional abatement, monitoring, auditing, and administration costs which would be incurred by government and industry if the proposed regulatory changes were made; and

- o the estimation of the economic costs and consequences of implementing the proposed revisions to regulation 308.

The second study, ie. the estimates of the economic costs and consequences of the proposed revisions, has been carried out at two levels: at the industry or sector level, and at the province wide economy level. This report presents the results of the analysis of the economic impacts at the industry, or microeconomic, level. The main purpose of this industry level analysis was to identify firms or categories of firms which would be likely to experience the greatest financial difficulties in complying with the revised regulation 308 which is being proposed.

The analysis in this report consists of:

- o overviews of the sectors identified;

- o an analysis of the estimated compliance costs that would be incurred by these industries, and firms within the industries; and

- o preliminary conclusions as to the impact which estimated compliance costs will have on the industries examined.

This report is intended to provide information to the Ministry which will be helpful in evaluating proposals made in the Green Paper. This information is complementary in this respect to the macroeconomic level study of impacts on the Ontario economy, conducted by Informetrica Ltd.

2.0 INTRODUCTION: ASSESSING INDUSTRY'S POTENTIAL FINANCIAL DIFFICULTIES IN COMPLYING WITH THE PROPOSED REGULATIONS

2.1 THE COSTS AND BENEFITS TO INDUSTRY OF COMPLYING

The issue in this part of the Ministry's assessment of its proposed revisions to Regulation 308 is the identification of those industry sectors which might face financial difficulties in complying with the draft air pollution control proposals contained in the Ministry's discussion paper.

Thus, the question to be addressed is whether or not the affected industry sectors will be able to bear the financial costs of complying with the draft proposals.

There are three categories of financial costs which industries might have to bear under these draft proposals:

- o capital costs of installing in a new plant, or retro-fitting in an existing plant, the equipment required to bring a plant's emissions to approved levels;

- o operating costs associated with the on-going operations and maintenance of any such capital equipment; and

- o monitoring costs (both capital and operating) incurred in carrying out the required sampling and analysis tasks to ensure that a plant's emission are in accord with the regulations.

All three costs must be considered in assessing the financial strain which these draft proposals might place upon an industry.

In general, the benefits of reducing pollution accrue to society at large rather than to the individual companies which reduce their emissions of pollutants. However, pollution abatement and control can result in direct financial benefits to the affected industries. For example: in some cases, the removal of SO2 from air emissions has led to the establishment of a commercial operation manufacturing and selling sulphuric acid. As well, there are examples of commercial uses being found for products which had previously been regarded as wastes. Such benefits can reduce the original costs of complying with the regulations, and should be factored into the overall assessment of the industry's potential financial compliance difficulties.

2.2 ASSESSING THE POTENTIAL FINANCIAL DIFFICULTY OF COMPLIANCE

In theory, the assessment of the likely financial compliance difficulties of an industry sector sounds like a simple task. The costs of compliance, net of any direct benefits, are compared with the industry's ability to pay and a conclusion drawn about the ease or difficulty with which the industry sector will be able to react to the increased costs which it might have to bear under the proposed air pollution control regulations.

In practice, this assessment is a difficult matter.

The difficulties are encountered in both of the steps identified above, i.e.:

- o determining the financial status of an industry sector; and
- o assessing the ability, and willingness, of the companies within the sector to pay the compliance costs.

2.2.1 THE FINANCIAL HEALTH OF AN INDUSTRY SECTOR

The financial health of an industry sector is complex to define. Consider the following points.

- o An industry sector is really just the collection of individual firms which fit within the definition of the sector. Sometimes it is appropriate to speak about the sector as a whole; at other times, it is not, and the analysis must address individually the companies or groups of companies in the sector. These firms might be dramatically different from each other, in their size, production, marketing and corporate set-ups, or they might be duplicates of each other, using the same manufacturing technology, sharing the same corporate set-ups, and selling through similar distributors. Judging an industry sector to be "healthy" on the basis of the stability and profitability of its largest members may overlook the narrow margins and vulnerability of its smaller, or other groups of, members.

- o The financial status of an industry sector is seldom fixed. It varies over time in response to supply, demand, competition, government regulation, exchange rates, cyclical factors and many more variables. Judging a sector to be financially "healthy" because of its current results has to be conditioned by, for example, the fact that some sectors have major cyclical down-turns, or are sensitive to exchange rates, and must provide themselves with financial cushions if they are to survive both the good and the bad times. Similarly, financially healthy sectors might be facing large investments to meet new competition.

- o There is no simple measure of financial health of a sector, nor for the companies within the sectors. Financial analysts compute a variety of financial ratios for companies and sectors, and each such measure offers a useful insight into a particular aspect of the company's financial health. But there is no simple measure that can summarize the extent to which

an industrial sector can absorb an increased cost and expect to remain competitive.

2.2.2 ABILITY AND WILLINGNESS TO PAY

Determining the ability, and willingness, of the affected companies to pay the net costs of pollution abatement regulations is the next step, once the financial status of the industry and its member companies has been established.

The "ability" of a company and sector to incur the financial costs of complying with the air pollution regulations is inferred from the results of the analysis of the financial health and market status of the sector and its companies. Sectors and companies which are characterized as having low profit margins, high levels of price competition with foreign industries, and out-dated technology could be expected to encounter difficulties in paying the costs of complying with regulations if the costs turn out to be significant. On the other hand, industry sectors characterized as price-makers, with good profit margins, strong market presence, and the ability to pass on at least a part of its cost increases to its customers, might be expected to have less difficulty in meeting reasonable financial requirements in complying with pollution regulations.

Similarly, companies which, because of their market dominance or the nature of their service, have the ability to pass on any reasonable increased costs to their customers, may have less difficulty in meeting the financial requirements of the new regulations.

Considerable care must be exercised in carrying out and interpreting this analysis of the ability of a company or sector to pay the financial costs of compliance. In our economic system, the "ability to pay" of a company will be decided ultimately by its shareholders and directors. A particular group of directors might see as unwarranted any appropriation by government regulation of the company's expected financial return, and thus decide that their particular company is "unable" to pay. We discuss this in the following paragraph. The purpose of the ability to pay analysis of this project is not to usurp that final decision authority of a company's directors, but rather to assist the Ministry in identifying those sectors and companies which might be expected to have significant financial difficulties in complying either because the financial costs of compliance are very high, or because the sector or companies are in serious financial difficulties already.

The notion of "willingness" to pay must now be explained. We do not refer to whether or not a company's chief officers are personally willing to comply with the government's regulations. We assume that all industrial operations in Ontario will comply with the government's regulations when they are introduced. What we refer to here is the ability of the parent company to close down the affected production, or move the affected industrial operations to a different jurisdiction, if it chooses to not pay the costs of complying with the new pollution control regulations. For example: an Ontario subsidiary of a foreign-owned company might be in a very healthy financial and market situation, yet the parent company might be unwilling to pay the pollution control costs. Perhaps it can produce the same goods elsewhere at lower cost, and thus retain its high returns. Similarly, an Ontario company with the ability to move its operations to a jurisdiction which did not have similar environmental control measures, might decide to make the move

rather than incur the pollution control costs of Ontario. Thus, even though an industry sector and its member companies might be in healthy financial and market positions and seem to be capable of absorbing the extra costs of the air pollution control regulations, they might choose to not do so by closing down all or part of their operations in Ontario. Of course, companies doing so run the risk of undertaking such a move only to find that similar pollution control regulations are introduced in their new locations in response to similar public concerns about the effects of air pollution.

2.2.3 THE ROLE OF POLLUTION CONTROL COSTS IN BUSINESS INVESTMENT LOCATION DECISIONS

This issue of the role of increased pollution control costs in a company's decision to locate its facilities, must be placed in perspective. The specific question raised in most discussions of this issue is some variant of the following:

> "if we introduce new legislation controlling pollution, will industry close down its operations in our area and take its jobs and investment elsewhere?"

All of the developed countries of the world, and some of the developing ones, are confronting this question as they seek a greater degree of concordance between the goals of economic growth and a clean environment. The experience to date does not yield simple answers to the question.

Deciding where to place its production facilities is one of the more complicated questions faced by large businesses. Many factors enter into the analysis, including: current and forecast exchange rates; labour availability and rates; the costs of social programs; availability of the required raw and other materials; transportation costs; local markets; trading and tariff agreements; and others, including regulations governing pollution abatement and control.

The last 10-15 years has seen a great deal of migration of industry within North America and around the world, with companies and whole industries relocating their plants in areas that offer competitive advantages to the firms. The global structures of industries such as steel-making, auto manufacturing, textiles, clothing, mining and others are changing constantly as the firms in the sectors continue to search for competitive advantages. However, it is very rare that such structural adjustment is tied to just one of the factors listed above. It is usually the overall package of factors that guides a firm's decision on where to locate its facilities. Pollution abatement and control costs are one of the factors that go into this decision.

This observation leads to two considerations to be borne in mind when assessing the likely effects upon industries of the costs of this proposed regulation:

- If it turns out that the pollution abatement and control costs, taken alone, appear to represent a small claim on an industry's profits, this should not be inferred to mean that the program will have negligible effects upon the industry. It is the cumulative burden of such costs, weighed against the cumulate benefits and advantages, which will prevail.

Many such small claims against an industry's profits can make it uncompetitive.

- The other side of the coin is that costs which appear to impose a significant burden upon an industry might in fact just reduce somewhat the cumulative advantages which the industry is currently enjoying.

It requires a very detailed analysis of individual sectors and firms within the sectors before a judgment can be made about the likely effect of the costs on the firms. This report constitutes the first step in such an analysis.

3.0 METHODOLOGY

3.1 OVERALL APPROACH

We began this task by collecting background information on the Ontario industries identified by the Ministry as those likely to be affected by the new regulations. It was necessary to understand the structure of each industry before proceeding with any analysis. Much of this information was taken from the Municipal Industrial Strategy for Abatement industry profiles.

Necessary to any industry analysis were the actual abatement and monitoring compliance costs for each industry, supplied to us by Senes consultants.

Our information on each industry and on compliance costs they would have to bear were then used to assign a "degree of difficulty" parameter to each industry or sector. The degree of difficulty parameter used was a number ranging from 0 to 3, interpreted as follows:

- the number "0" was accorded to industries which would not face any incremental compliance costs. Such industries were typically already in compliance with emission standards proposed by the Ontario Ministry of the Environment;

- the number "1" was accorded to those industries where significant financial compliance difficulties were not expected, although this did not rule out the possibility of any difficulties whatsoever;

- the number "2" was accorded to industries where we believed there was a possibility of some financial compliance difficulties; and

- the number "3" was accorded to industries for which significant financial difficulty was expected to arise.

This parameter was used, along with measure's of the group's economic activity and importance to the Ontario economy, to select sectors of interest for further study. In general, those sectors which had been assessed a "2" or "3" were selected as sectors of interest requiring further, more detailed, analysis.

This analysis was conducted with the assistance of industry representatives, government officials and other individuals who had extensive knowledge of the industry. Numerous phone and personal interviews were conducted with such industry experts to gain insights on the present and future state of the industry.

For industries and individual companies examined, factors which were focussed on during interviews included the following:

- The size and ownership of companies involved in the industry of interest. We discovered whether companies were independent businesses,

or vertically integrated operations. For instance, companies involved in an industry may be small independent privately owned operations which have production facilities in Ontario only and which focus on one product line. Other companies may be large, vertically integrated, with operations in other provinces or countries. The impact of compliance costs on such different types of operations may be quite different. Furthermore, companies with operations elsewhere may have the choice of moving their productions to a location where they would not be burdened with compliance costs. Companies with a diversified line of products could also choose to discontinue the production of the offending product in order to avoid compliance costs.

- The current and expected profitability of the industry and companies involved was also a factor considered. We looked at whether or not the industry was profitable, whether sales were increasing, and whether or not the industry was of a cyclical nature.

- The sales price, production cost and profit margins were sought whenever possible. Compliance costs may represent only a very small percentage of the selling price, yet profit margins may be so small as to be seriously affected by compliance costs.

- To put the compliance costs in an appropriate perspective, for each sector we have identified some measure of output (e.g. tonne, cubic metre, etc) and we present the abatement and monitoring costs as a percentage of the cost, selling price, or profit (as appropriate) of that output. We also present the percentage of the value added of the sector that would be consumed by the costs, using the results of the runs of the macroeconomic model of Informetrica. Details of the method of calculating the costs can be found at Appendix B. Briefly, we calculated the net present value (npv) of the cost stream, net of tax benefits, and converted that npv to a uniform annual cost (uac) for the sector.

- The analysis of the value - added figures for the sectors warrants some explanation. The sector analysis would be simplified if there was some fixed percentage of value-added which constituted a threshold. Pollution abatement costs above the threshold would be a significant burden to the industry, while costs that stayed below the threshold could be absorbed by the sector without serious consequences. Unfortunately, there is no such useful threshold value.

  Informetrica's analyses of industries have led them to conclude that as a broad generalization, about 70% of the value-added in industries is allocated to wages and labour. This leaves about 30% to service the capital. Some twenty percentage points of this total is used for capital consumption and depreciation leaving about ten percent available for return on investment. Thus, for highly competitive industries with low margins and little ability to pass costs through to their consumers, even 2 or 3 percentage points of the value added can be a significant share of the return on investment.

- This micro-level industry analysis sometimes yields conclusions that are different from the macroeconomic level analysis of Informetrica. For example: this study might conclude that the compliance costs are not significant, whereas the Informetrica model might show the costs to consume a large share of the value-added. In most cases, these difference are probably due to differences in the definitions of the sectors. The MOE sectors of interest are frequently just a part of a larger sector defined in the Informetrica model.

- The competitiveness of each industry was also an important component of our analysis. Ontario's industries in many cases face competition from other provinces, the U.S., and other producers worldwide. The nature of competition was also examined. Competition can be based on price or quality. The reasons for any competitive advantage Ontario or other producers may enjoy was questioned. Many products in Ontario must compete with imports from newly developed countries which do not face the same labour, power, or other costs. In industries where price competition is fierce, compliance costs can significantly erode profit margins, or affect the ability of Ontario companies to compete in the global marketplace. In obtaining information on competitiveness, we also looked at such factors as whether or not Ontario companies held a price setting or price taking position. In many cases, companies in Ontario have little control over the price their products sell for, as prices are determined in the global marketplace.

- Future outlook for the industry was also examined. For example, we questioned whether or not competition from other producers, alternative materials, etc., were expected to increase.

- Information on the technological innovativeness of an industry and companies within an industry was useful to our analysis. Whether the industry is a leader in the use of modern and efficient technology, or consists of antiquated plants in need of modernization, may also affect the reaction of companies to regulations. A company which focusses heavily on research and development might find ways to cope with the burdens of emission regulations, through finding new spin-off benefits or developing its own technological fixes. On the other hand, a firm with a plant which is old, antiquated, and less productive may have a different reaction to regulatory costs.

3.2 DATA AND INFORMATION SOURCES USED

We have used the following information sources to obtain information on our selected sectors of interest:

- Industry associations;

- Industry profiles produced by the Ministry of Environment as part of background research for the Municipal Industrial Strategy for Abatement (MISA);
- interviews with company representatives;
- interviews with consultants representing the industry;
- interviews with government officials involved in analyzing the industries;
- published industry profiles, reviews, forecasts;
- articles in industry publications or magazines;
- the U.S. experience with air pollution regulations in these industries; and
- submissions made to the Ministry by industries regarding the Clean Air Program discussion paper proposals.

SECTORS OF INTEREST

SIC	INDUSTRY	#OF PLANTS	EMPLOYMENT	ANNUAL PRODUCTION AT CAPACITY
1049	Other Dairy	94	4,864	107,529 tonnes cheese
	sector affected by regulation:			
	•whey powder production	7	NA	NA
2711	Kraft Pulp Mills	9	7,207	946,200 tonnes pulp
2712	Newsprint mills	11	,189	1,195,000 tonnes newsprint
	sectors of interest:			
	• newsprint mills with kraft pulping	2	NA	1,107,000 tonnes
	• newsprint mills with sulphite pulping	3	NA	460,000 tonnes
2713	Paperboard Mills	16	2,737	751,000 tonnes paperboard
	sector of intest:			
	• paperboard mills with kraft pulping	2	1,154	587,000 tonnes
2911	Ferroalloy	1	16	1,350 tonnes
2912	Steel Foundries	22	39,009	12,686,200 tonnes
2941	Iron Foundries	61	7,110	1,584,180 tonnes
2959	Non-Ferrous Smelters	15	7761	829,314 tonnes
2971	Copper and Brass Works	23	2,149	78,400 tonnes
2999	Rolled Casting	63	5,623	75,529 tonnes
3231	Automotive and light duty truck surface coating	212	1,895	2,162 200 vehicles
3259	Wet cell automotive battery production	5	548	7,365,120 batteries
3511	Domestic Clay	26	1,405	1,593,000 tonnes
3521	Cement	8	2,092	7,875,000 tonnes
3581	Lime	9	885	3,085,000 tonnes
3699	Asphalt Plants	150	1208	84,300,000 tonnes
	Affected by regulation: portable plants with Venturi Systems	24	200	12,300,000 tonnes
3712	Organic Chemicals	37	7,114	878,720 tonnes
3791	Printing Ink	40	1,693	63,830 tonnes
3799	Other Chemicals	188	9,891	420,327 tonnes
4999	Waste Disposal	47	NA	NA
	sector of interest: private waste incineration	3	NA	81,120 tonnes
9211-9213	Restaurants	15,000	75,000	NA
	sector of interest:			
	• charcoal burning restaurants	200	1000	NA
9721	Dry Cleaning	1200	12000	36,000 tonnes of clothing processed

4.0 THE SECTORS OF INTEREST

The exhibit on the facing page lists the sectors selected for further detailed analysis, along with three indicators of their importance to the Provincial economy. The analyses of these sectors of interest are contained in section 5 of this report.

These sectors of interest are all private sector industries. Although the public sector may also have to bear significant costs in complying with the proposed changes to regulation 308, they have not been included in our analysis. Costs incurred by the public sector will in all likelihood be spread out over the tax base. The Government itself will then decide whether or not it considers compliance costs to be a significant burden to taxpayers.

5.0 SECTOR APPRAISALS

This section contains the analyses of the sectors of interest. Each analysis consists of an overview of the sector, an analysis of estimated compliance costs for the sector, and conclusions regarding the impact of compliance costs on the industry.

Both the abatement and monitoring costs are presented. Each of these two categories of costs in turn has both a capital and an on-going annual operating component.

Comments made in industry submissions to the Ministry about the likely impacts of the proposed legislation on their operations, are presented in summary form at Appendix A.

5.1 OTHER DAIRY

The only sector of the Ontario Dairy industry which will be affected by the proposed new regulations is the production of whey powder. Skim milk powder is produced using a similar process; however, the emissions of these plants will be within the proposed guidelines and will not require additional controls.

Whey powder is produced from whey, a liquid waste product of cheese production. About 80% of the milk used in cheese-making ends up as whey. 1000 gallons of whey are produced for every 2000 pounds of cheese produced. Whey is an environmental concern because it has a very high BOD and the evaporation processes used in the production of whey powder (and skim milk powder) is a source of air pollution. Canada produces 1.5 million tonnes of whey (liquid) per year.

Sources contacted for information on the Ontario whey drying industry are:

- o the provincial and federal dairy councils;
- o representatives of firms involved in the production of whey powder.

5.1.1 OVERVIEW OF THE SECTOR

According to industry representatives, only a small number of the cheese companies are involved in the whey drying process. There are about eight companies with an evaporator or drying component, i.e., involved in the production of whey powder or skim milk powder. Most of these are large and the industry is relatively competitive.

Mentioned by industry representatives as being producers of whey powder were:

- o McCain
- o Canada Packers
- o Kraft
- o Alt Foods

Industry representatives state that these producers are slowly turning a cost-recovery industry into a profit industry. The whey powder market has picked up and the prices have firmed up. The companies that are capable of producing whey powder are bidding against each other to buy whey. The whey powder is currently used by the baking industry and by confectioners (small amounts of whey butter are also made from the product). Industry representatives state that the production is marginally profitable, but more uses for whey powder need to be discovered in order to make the industry really profitable.

Current prices are $0.50 - $0.70 per kilo for whey powder. There is currently a shortage of whey powder world-wide and this is expected to continue into the next year.

According to Statistics Canada representatives, the total production of whey powder in Canada in 1987 was 65,950 tonnes. The majority of this is produced in Ontario and Quebec. Due to the competitive nature of the industry, the representatives were not able to provide a breakdown of production by province, nor were they able to provide figures on production capacity.

5.1.2 COMPLIANCE COSTS

Unfortunately, the compliance costs developed during this study were for the cheese industry. These costs may not be entirely accurate when applied to the whey powder production industry. The two industries differ in the number of plants, production capacity and possibly even emissions. However, in the absence of any other cost estimates, we will use the cost estimates provided for the cheese industry.

The total abatement and monitoring capital costs for the industry to comply is $10.6 million under all three scenarios. The total annual operating costs for the industry are $2.6 million.

The net present value of these costs is $13.5 million, and the uniform annual costs will be $1.8 million. The uniform annual cost per tonne of cheese (calculated using industry capacity figures) is $17 per tonne.

The Informetrica models only produced values for the food manufacturing industry as a whole. The whey drying industry is a very small part of this sector. These values are therefore not relevant to the whey drying industry.

5.1.3 CONCLUSIONS

In the absence of information specific to the whey-drying segment of the industry, no firm conclusions can be drawn about the impacts of the proposed changes. However, it is important to note that the whey-drying industry is apparently a fledgling one, just approaching the stage of cost-recovery, and is accomplishing other environmental goals by disposing of whey in a useful way.

5.2 RESTAURANTS

The restaurants in Ontario which produce hazardous emissions and which would be controlled by Regulation 308 are those which burn charcoal.

Information on charcoal-burning restaurants in Ontario was obtained through:

- the Ontario Restaurants and Food Services Association;
- major restaurant chains operating in Ontario;
- a charcoal supplier; and
- a manufacturer of charcoal-burning equipment in Ontario.

5.2.1 OVERVIEW OF THE SECTOR

There are 9,000 licensed restaurants in Ontario, and figures obtained from taxation and worker's compensation data indicate that there are between 20,000 - 22,000 establishments including all food service and industrial catering centres.

Unfortunately, as with the restaurant industry in general, there are no available data on the number and size of charcoal-burning restaurants. None of the industry experts was able to establish the number of these restaurants. To arrive at a more or less reliable approximation of the number of charcoal-burning restaurants in Ontario, we first polled the larger chains to establish a representative number of charcoal-burning restaurants. The chains polled and the number of establishments is presented below:

ESTABLISHMENT	# IN ONTARIO	CHARCOAL-BURNING
Swiss Chalet	100	yes
McDonald's	212	no
Harvey's	226	no
Kelsey's	20	no
O'Toole's	48	no
The Keg	23	yes
St. Hubert's	28	no
Burger King	103	no
Steak and Burger	25	no
Total #	775	
Charcoal-Burning	123	

% Charcoal-Burning
Restaurants among the major chains 15.87

Since this survey did not include any of the non-franchised owner operated establishments, nor other establishments involved in different price ranges and specialty sectors (i.e., ethnic restaurants) of the industry, we believe that the figure obtained through this method overestimates the actual number of charcoal-burning restaurants. Swiss Chalet representatives felt that they held

COMPLIANCE COSTS

RESTAURANTS

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	4.5	4.5	0
• per plant	0.0225	0.0225	0
Annual Operating Costs:			
• total sector	0.3	0.3	0
• per plant	0.0015	0.0015	0
Monitoring costs			
Capital cost:			
• total sector	10.7	10.7	0
• per plant	0.0535	0.0535	0
Annual Operating Costs:			
• total sector	1.0	1.0	0
• per plant	0.005	0.005	0
Total:			
Capital cost:			
• total sector	15.2	15.2	0
• per plant	0.076	0.076	0
Annual Operating Costs:			
• total sector	1.3	1.3	0
• per plant	0.0065	0.0065	0
Net Present Value per plant	0.043	0.043	0
Uniform Annual Cost per plant	0.006	0.006	0

Costs Per restaurant

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform annual cost per charcoal burning restaurant	5,860.00	5,860.00	0.00
% of value added, of charcoal burning restaurants	3.1 to 12.1%	3.1 to 12.1%	0%

approximately 80-85% of the market share in charcoal-burning restaurants. Based on conversations with charcoal suppliers and other industry representatives who suggested that the proportion of restaurants in Ontario which burn charcoal is minimal, we estimate that approximately 200 restaurants in Ontario are involved in this industry sector.

Industry representatives have stated that there are no useful standard financial ratios for the industry. Due to the range in types and size of restaurants and the differences in operating costs and profit margins there are no averages for capital investment, operating costs or profits. Even if such data were available representatives of the industry felt that data from the restaurant industry in general would not be suitable to use as a representative of this type of restaurant.

5.2.2 COMPLIANCE COSTS

The necessary equipment that would need to be installed to meet compliance standards is called an ecology unit. The unit can be best described as a hood with filters in it that have been designed to recover the toxic emissions.

The facing table demonstrates the costs for Ontario charcoal-burning restaurants to comply with proposed regulations.

The total capital cost for the required abatement equipment is $22,500 per restaurant. The capital cost for monitoring equipment is $53,500 per restaurant, which results in a total capital cost per restaurant of $76,000. The accompanying operating costs for abatement and monitoring is $6,500 per year, per restaurant.

The net present value of these compliance costs is approximately $43,000 per charcoal burning restaurant in Ontario, while the uniform annual cost for compliance is approximately $5,860 per restaurant.

The econometric models of Informetrica indicate that compliance costs to the entire hospitality sector of the food industry (which includes charcoal burning restaurants) in Ontario could represent up to 12.1% of the value added of the industry under scenario A and B. Scenario C does not require any abatement controls be placed on restaurants.

5.2.3 CONCLUSIONS

The proposed amendments to Regulation 308 would affect only about 1% of all restaurants in Ontario. However, the costs are significant.

The restaurants affected can be divided into two groups:

- the franchised operators, i.e., Swiss Chalet; and
- the independent operators who use charcoal in some or all of their food preparation.

The independent operators can be expected to experience significant difficulty in meeting these compliance costs. The franchises may be in a somewhat better position, but it is possible that the additional costs would result in the closing down

of the charcoal-burning food preparation industry, either by conversion to gas barbecues, or by the removal of charcoal-based items from menus.

5.3 PULP AND PAPER

The Pulp and Paper SIC sectors which we identified for further study are as follows:

- o Kraft Pulp Mills (SIC 2711);
- o Newsprint Mills with Kraft Pulp (SIC 2712);
- o Newsprint mills with Sulphite Pulping (SIC 2712); and
- o Paperboard Mills with Kraft Pulp (SIC 2713).

Sources contacted for information on these Pulp and Paper sectors are:

- o the Forest Products Directorate of the Department of Regional Industrial Expansion;
- o articles taken from the *Pulp and Paper Journal*, Pulp and Paper Week, and the Globe and Mail;
- o Canadian Forestry Service;
- o Great Lakes Forestry Centre; in particular their 1988 profile report on the Ontario Pulp and Paper industry;
- o Canadian Pulp and Paper Association; in particular their 1987 Reference Tables;
- o Pulp and Paper Research institute of Canada; and
- o MISA profile of the pulp and paper industry.

5.3.1 OVERVIEW OF THE SECTOR

Price increases and the continuing strong demand for Canadian pulp and paper exports have brought record profits to most pulp and paper companies in the past year. The majority of Canadian Pulp and Paper Companies are expanding their capacity to deal with the increased demand.

While companies have been recording record profits and announcing modernization and expansion projects, many industry analysts view these actions negatively. John Carroll, vice-president of Andras Research Capital Inc. of Montreal states: "I think Pulp and Paper companies have shot themselves in the foot again . . . There's another 800,000 tonnes of newsprint proposed or under study in the U.S., there's as much proposed in Europe . . . Unless we have a really strong continuation of this business cycle . . . I'm sure there will be too much supply around in 1990." Many capacity expansion projects will likely come on stream at the same time and could depress the market.

The Pulp and Paper industry is one of the most cyclical in the world, and it is just a matter of time before prices for pulp, paper and building material decline. Forecasts given by the *Pulp and Paper Journal*, and Report on Business all seem to give the view that 1989 will be a weaker year than 1988, and that in 1990 earnings will continue to drop, the capacity utilization for the industry will drop and there will be more than adequate supplies of newsprint and pulp. It is generally felt that current expansion plans are excessive. However, industry analysts agree that

Canadian companies are in need of modernization if they are to continue competing in the global marketplace.

The *Pulp and Paper Journal* also notes that several Canadian Pulp and Paper companies are diversifying out of Canada. Some companies are moving south (i.e., Venezuela) to achieve geographic diversity and to take advantage of lower labour, power, wood and transportation costs.

5.3.2 KRAFT PULP MILLS

There are 6 firms and a total of 9 plants involved in the manufacture of Kraft Pulp in Ontario. These companies, their ownership, and the daily capacity of each are as follows:

1. Great Lakes Forest Products Ltd.:

   - 2 Ontario mills involved in the manufacture of Kraft Pulp;
   - 54.28% owned by Canadian Pacific Enterprises, a Canadian company;
   - total kraft pulp production volume for the 2 mills of 2,000 tonnes daily.

2. E.B. Eddy Forest Products Ltd.:

   - 2 Ontario mills involved in the manufacture of Kraft Pulp;
   - owned (100%) by George Weston, which is Canadian-controlled;
   - total kraft pulp production volume for the 2 mills of 1,700 tonnes daily.

3. Boise Cascade Canada Ltd.:

   - 2 Ontario mills involved in the manufacture of Kraft Pulp;
   - owned (100%) by Boise Cascade Corporation, an American company;
   - total kraft pulp production volume of 1,410 tonnes daily for the 2 mills.

4. James River Marathon:

   - 1 Kraft Pulp mill in Ontario;
   - 80% owned by James River Corporation (U.S.), and 20% owned by Buchanan Forest Products (Canadian);
   - daily kraft pulp production volume of 500 tonnes.

5. Malette Kraft Pulp and Paper:

   - 1 Kraft Pulp mill in Ontario;
   - 100% owned by Waferboard Corporation Ltd.;
   - daily Kraft Pulp production volume of 300 tonnes.

6. Kimberley-Clark Corporation of Canada:

   - 1 Kraft Pulp mill in Ontario;
   - 100% owned by Kimberley-Clark Corporation of the U.S.;
   - daily kraft pulp production volume of 1,145 tonnes.

Canada is the world's largest producer of market pulp. Canada produces close to 8 million tonnes of market pulp annually, valued at approximately $4 billion, of which almost 90% is exported. Although Canada is the world's largest producer, the *Pulp and Paper Journal* states that only 19 of the 53 market pulp mills in Canada are considered world-class in size, although they are using modern, high-tech equipment. Productivity improvement among market pulp producers in Canada has not kept pace with that of foreign competitors. Modernization will be important to ensure long-term viability of Canadian producers.

A significant portion of all grades of pulp produced in Canada is exported. In 1985, roughly 33% of all pulp produced in Canada was exported. Of this amount, 51% of exports were to the United States.

Ontario firms face competition from Western Canada, U.S., and Sweden. Western Canada Pulp and Paper companies have costs somewhat lower than those in Ontario as they are able to obtain cheaper supplies of wood chips from the lumber industry. The competitive strength of American and European companies is largely dependent upon relative currency exchange values. The values are currently favouring Canadian producers.

Competition in this industry is based on both price and quality, though price is the major factor. Ontario producers do offer high quality in their pulp and paper products and are therefore able to compete on these terms. Industry representatives contacted suggested that Ontario firms currently tend to be price setters rather than takers in the market.

Annual sales, profits, and capital expenditures are available for most of these Ontario companies, from the August edition of the *Globe and Mail* Report on Business Magazine, from MISA profiles, and from the *Pulp and Paper Journal*. Information by company, for Ontario's Kraft Pulp manufacturers is as follows:

1. Great Lakes Forest Products:

    - o 1987 revenue of $752 million, an 18% increase over 1986;
    - o 1987 profits of 96 million, a 220% increase over 1986;
    - o capital spending of $52 million;
    - o new capital investment projects planned: 1) replacement of 2 newsprint machines at their Thunder Bay mill for a cost of $215 million; and 2) increase of fine-paper capacity at the Dryden Ontario mill for a cost of $175 million.

2. E.B. Eddy:

    - o no financial information available;
    - o numerous capital investment projects underway, such as woodyard modernization, rebuild pulp mill, and paper mill improvement. The total cost of planned projects at both E.B. Eddy Ontario mills is $83.2 million. Of this amount, $31.8 million will be spent in 1988.

3. Boise Cascade:

    - o 1987 revenue of $412 million;

COMPLIANCE COSTS

KRAFT PULP MILLS

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	44.5	53.1	36.9
• per plant	4.9	5.9	4.1
Annual Operating Costs:			
• total sector	0.7	0.7	0.3
• per plant	0.08	0.08	0.03
Monitoring costs			
Capital cost:			
• total sector	9.9	9.9	9.9
• per plant	1.1	1.1	1.1
Annual Operating Costs:			
• total sector	3.5	4.1	2.5
• per plant	0.4	0.5	0.3
Total:			
Capital cost:			
• total sector	54.4	63.0	46.8
• per plant	6.0	7.0	5.2
Annual Operating Costs:			
• total sector	4.2	4.8	2.8
• per plant	0.5	0.6	0.3
Net Present Value per plant	3.2	3.7	2.9
Uniform Annual Cost per plant	0.4	0.5	0.4

Compliance Costs Per tonne

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform annual cost per tonne of kraft pulp	4.00	5.00	4.00
compliance costs:			
• as a % of value added of pulp and paper manufacturing	<1%	<1%	<1%
• as a % of selling price	<1%	<1%	<1%
• as a % of profit	1.6%	2%	1.6%

- o no profit figures available;
- o 1985 annual capital expenditures of $165 million;
- o capital expansion plans for Boise Cascade include a $319 million modernization program planned for their Fort Frances and Kenora mills.

4. James River Marathon:

   - o no financial information available;
   - o capital investment plans for James River Marathon involve capital expenditures of $42 million in 1988-89, and an estimated $40 million between 1989-92.

5. Malette:

   Information available on owning company: Waferboard Corporation:

   - o 1987 revenues of $125 million, a 74% increase over 1986;
   - o 1987 profits of $11 million, a 206% increase over 1986;
   - o no information available on capital expenditures.

6. Kimberley-Clark:

   - o 1985 sales for Canadian operations of $544 million;
   - o 1985 net income for Canadian operations of $17 million;
   - o 1985 capital expenditures for Canadian operations of $36 million.

The Canadian pulp and paper industry is generally considered to be a high cost producer relative to the U.S. and Scandinavia. In a 1985 study of cost commissioned by the Forest Sector Advisory Council, they found that the delivered cost of Canadian bleached market softwood kraft pulp was much higher in Eastern Canada as compared to Finland, Sweden and the U.S. south. In addition, the study showed that delivered costs of Canadian newsprint were roughly 10% higher than Finland, Norway, Sweden and the U.S.. However, this study was updated in October 1987 to include 1985 and 1986 figures. The updated figures show that costs in Sweden and Finland have increased dramatically since the original study and that Canada is no longer bottom ranked in terms of delivered costs. The 1986 delivered cost of bleached market softwood kraft pulp, expressed in Canadian dollars per Air Dry Metric Tonne for the seven regions included in the study are:

	1986	1985
U.S. South	$449	$492
B.C. Interior	$454	$476
B.C. Coast	$490	$528
Eastern Canada	$501	$521
U.S. West	$518	$513
Finland	$561	$479
Sweden	$567	$453

Changes that have taken place since the original study include the significant appreciation of Finnish and Swedish currencies against both North American currencies.

According to the MISA profile, the Conference Board of Canada, in a 1984 study, noted that tax systems play a role in regional competitiveness. In this respect, Canadian pulp and paper producers were at a disadvantage relative to the U.S., Brazil and Sweden. These findings were corroborated by a 1985 study of the profitability of the Ontario pulp and paper industry done by Anderson and Bonsar. This study found that the tax system reduced the competitiveness of Ontario firms relative to the U.S.. They found that investment incentives created by the Canadian tax system were denied to firms not already in the industry; to firms with large capital expenditure plans relative to current tax liabilities; and to firms whose operations were currently unprofitable.

Average selling price per tonne of Kraft Pulp for companies in Ontario is presently:

Bleached Softwood:	$700 U.S. per tonne delivered; $805 Canadian
Bleached Hardwood:	$665 U.S. per tonne delivered; $765 Canadian
Unbleached Softwood:	$635/$665 U.S. per tonne delivered; $730/$765 Canadian

However, the industry anticipates a $35 (U.S.) per tonne increase in prices in July.

5.3.2.1 Compliance Costs for Kraft Pulp Mills

The facing table illustrates the compliance costs for kraft pulp mills in Ontario to comply with proposed changes to Regulation 308.

The total capital cost per kraft pulp mill is $6 million under scenario A, $7 million under scenario B, and $5.2 million under scenario C. The accompanying annual operating costs per pulp mill are $0.5 million under scenario A, $0.6 million under scenario B, and $0.3 million per mill under scenario C.

The net present value of these costs to each Kraft pulp mill is $3.2 million under scenario A, $3.7 million under scenario B, and $2.9 million under scenario C. The uniform annual cost per pulp mill is approximately $0.4 million under scenario A and C, and $0.5 million under scenario B.

The cost per tonne per year at industry capacity, using uniform annual costs for the Kraft pulp industry in Ontario, is about $4 per tonne for scenario A and C, and $5 per tonne for scenario B.

These costs represent between about 0.5% and 0.7% of selling prices per tonne for kraft pulp. The selling prices used to calculate this percentage are current prices converted to 1986 dollars.

According to a report published by the Forest Sector Advisory Council, the delivered cost of bleached softwood kraft pulp was $501 in Ontario in 1986. As the selling price for this pulp (converted to 1986 dollars) is $745 dollars per delivered tonne, the profit from one tonne would be approximately $245. The uniform annual cost per tonne as we have calculated it, would represent between 1.6% and 2% of this profit.

The econometric models of Informetrica indicate somewhat less serious impacts of regulatory costs on the value added of the industry. These models indicate that compliance costs to the pulp and paper manufacturing industry in Ontario would represent less than 1% of the value added of the industry under all three scenarios. However, Informetrica calculations have been made for the pulp and paper manufacturing industry as a whole, while our analysis here focuses on the Kraft pulp sector only

5.3.2.2 Conclusions

The sector is now in a healthy situation. However, this is a highly competitive sector and the current dominant situation of Ontario mills may not last.

The estimated compliance costs for kraft mills represent up to 2% of profits. This does not seem to be particularly onerous in the current market conditions. However, the industry is highly cyclical and under intense competitive pressures from other Provinces, the U.S., Europe and South America. The sector is in need of capital-intensive modernization and the imposition of additional costs can be expected to affect the modernization plans.

5.3.3 NEWSPRINT MILLS WITH KRAFT PULP; AND NEWSPRINT MILLS WITH SULPHITE

5.3.3.1 Overview of the Sector

There are a total of 11 newsprint mills in Ontario. Those which will face high compliance costs are those newsprint mills with kraft pulping, and those with sulphite pulping. The companies and mills which are involved in these sectors are as follows:

SULPHITE NEWSPRINT MILLS:

1. Abitibi-Price Inc., Iroquois Falls Division; and Thunder Bay Division.

   Abitibi-Price is 93.2% owned by Olympia and York Developments Ltd., Toronto

2. Boise Cascade Canada Ltd., Kenora, Ontario

   Boise Cascade is 100% owned by the Boise Cascade Corp. (U.S.)

KRAFT PULP NEWSPRINT MILLS:

1. Great Lakes Forest Products Ltd., Thunder Bay, Ontario

   54.3% owned by Canadian Pacific Enterprises Inc.

2. Domtar Inc., Trenton, Ontario

   15% controlled by La Caisse du Depot at Placement du Québec.

According to a report published by the Canadian Forestry Service of Canada, Abitibi-Price controls 29% of Ontario's newsprint capacity, Boise Cascade controls 15%, Great Lakes Forest Products controls 20%, and Domtar controls another 4%.

According to the Canadian Forestry Service publication, exported newsprint is the most important product of the Ontario pulp and paper industry. A very high proportion of Canadian newsprint shipments are exported. In 1986, almost 88% of newsprint shipments were exported, and 82% of these exports went to the United States. Ontario newsprint producers hold a strong position in the U.S. midwest and northeast markets. The market share of Ontario newsprint producers in 1985 was approximately 46% in the U.S. midwest and approximately 12% in the U.S. northeast. Ontario newsprint producers held almost 14% of the entire U.S. newsprint market in 1985.

We have obtained financial information on these companies from the *Globe and Mail* July edition of the Report on Business Magazine.

1. Abitibi-Price:

   - 1987 operating revenue of almost $3 billion;
   - 1987 profit of $126 million;
   - 1987 capital expenditures of $257 million;
   - Abitibi-Price's total capital spending in 1988 is $240 million, and capital expenditures planned for 1989 is $250 million.

2. Boise Cascade:

   - 1987 revenue of $412 million;
   - no profit figures available;
   - 1985 annual capital expenditures of $165 million;
   - capital expansion plans for Boise Cascade include a $319 million modernization program planned for their Fort Frances and Kenora mills.

3. Great Lakes Forest Products:

   - 1987 revenue of $752 million, an 18% increase over 1986;
   - 1987 profits of $96 million, a 220% increase over 1986;
   - capital spending of $52 million.
   - new capital investment projects planned: 1) replacement of 2 newsprint machines at their Thunder Bay mill for a cost of $215 million; and 2) increase of fine-paper capacity at the Dryden Ontario mill for a cost of $175 million.

4. Domtar:

   - 1987 revenues of $2.6 billion;
   - 1987 profits of $161 million;
   - 1987 capital expenditures of $767 million.

The current selling price for a tonne of newsprint is about $700 (Canadian), according to the Pulp and Paper Week. The *Pulp and Paper Journal* indicated that the delivered cost of newsprint in Canada was $557 (Canadian) in 1986.

COMPLIANCE COSTS

NEWSPRINT MILLS WITH KRAFT PULPING

($ millions 1986)

COST TYPE \ SCENARIO	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	17.5	21.4	14.6
• per plant	5.8	7.1	4.9
Annual Operating Costs:			
• total sector	0.4	0.4	0.1
• per plant	0.1	0.1	0.03
Monitoring costs			
Capital cost:			
• total sector	4.5	4.5	4.5
• per plant	1.5	1.5	1.5
Annual Operating Costs:			
• total sector	1.6	1.6	1.1
• per plant	0.5	0.5	0.4
Total:			
Capital cost:			
• total sector	22.0	25.9	19.1
• per plant	7.3	8.6	6.4
Annual Operating Costs:			
• total sector	2.0	2.0	1.2
• per plant	0.7	0.7	0.4
Net Present Value per plant	4.3	4.6	3.0
Uniform Annual Cost per plant	0.6	0.6	0.4

Costs Per tonne of newsprint

($ 1986)

COST TYPE \ SCENARIO	A	B	C
Uniform Annual Costs per tonne of Newsprint	1.60	1.70	1.10
• as a % of value added, of pulp and paper manufacturing	<1%	<1%	<1%
• as a % of selling price	<1%	<1%	<1%
• as a % of profit	1.8%	1.9%	1.2%

5.3.3.2 Compliance Costs for Newsprint Mills

NEWSPRINT MILLS WITH SULPHITE PULPING:

The table on the back of this page illustrates the compliance cost for newsprint mills with sulphite pulping.

The total capital cost per mill would be $8.4 million under scenario A, $10 million under scenario B, and $7 million under scenario C. The accompanying operating costs are $0.45 million per mill under scenario A and B, and $0.35 million per mill under scenario C.

The net present value of these costs to each sulphite newsprint mill in Ontario is $3.6 million under scenario A, $3.9 million under scenario B, and $2.9 million under scenario C. The uniform annual cost per sulphite newsprint mill is $0.5 million under scenario A, $0.55 million under scenario B, and $0.4 million under scenario C.

As the price per tonne of newsprint is currently around $648 a tonne (in 1986 dollars), compliance costs represent about 0.3% of the selling price. However, if the delivered cost of newsprint is about $557 per tonne (in 1986 dollars), and the selling price is $648, then the profit per tonne of newsprint may be approximately $91. Uniform annual costs per tonne represent approximately 2% of the per tonne profit on newsprint.

The econometric models of Informetrica indicate even less serious impacts of regulatory costs on the value added of the industry. These models indicate that compliance costs to the pulp and paper manufacturing industry in Ontario would represent less than 1% of the value added of the industry under all three scenarios. However, Informetrica calculations have been made for the pulp and paper manufacturing industry as a whole, while our analysis focusses on several sub-sectors of the industry only.

NEWSPRINT MILLS WITH KRAFT PULPING:

The facing table illustrates the costs for newsprint mills with kraft pulp to comply with the proposed regulations.

The total abatement and monitoring capital cost per plant for compliance would be $7.3 million under scenario A, $8.6 million under scenario B, and $6.4 million under scenario C. The accompanying annual operating costs would be $0.7 million per plant under scenario A and B, and $0.4 million per plant under scenario C.

The net present value of these costs per kraft pulping newsprint mill in Ontario is $4.3 million under scenario A, $4.6 million under scenario B, and $3 million under scenario C. The uniform annual cost per mill is $0.6 million under scenario A and B, and $0.4 under scenario C.

The price per tonne of newsprint is presently about $648 per tonne. Compliance costs per tonne as calculated above therefore represent between 0.2% and 0.3%

COMPLIANCE COSTS

NEWSPRINT MILLS WITH SULPHITE PULPING

($ millions 1986)

COST TYPE \ SCENARIO	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	14.7	17.9	11.9
• per plant	7.4	9.0	6.0
Annual Operating Costs:			
• total sector	0.2	0.2	0.1
• per plant	0.1	0.1	0.05
Monitoring costs			
Capital cost:			
• total sector	2.1	2.1	2.1
• per plant	1.1	1.1	1.1
Annual Operating Costs:			
• total sector	0.7	0.7	0.6
• per plant	0.4	0.4	0.3
Total:			
Capital cost:			
• total sector	16.8	20.0	14.0
• per plant	8.4	10.0	7.0
Annual Operating Costs:			
• total sector	0.9	0.9	0.7
• per plant	0.45	0.45	0.35
Net Present Value per plant	3.6	3.9	2.9
Uniform Annual Cost per plant	0.5	0.55	0.4

Costs Per tonne of newsprint

($ 1986)

COST TYPE \ SCENARIO	A	B	C
Uniform Annual Costs per tonne of newsprint	2.00	2.00	1.70
• as a % of value added, of pulp and paper manufacturing	<1%	<1%	<1%
• as a % of selling price	0.3%	0.3%	0.3%
• as a % of profit	2%	2%	2%

of the selling price. However, if the delivered cost of newsprint is about $557 per tonne, and the selling price is $648, then the profit per tonne of newsprint may be approximately $91. Compliance costs represent between 1.2% and 1.9% of the per tonne profit on newsprint.

As noted above, the econometric models of Informetrica indicate somewhat less serious impacts of regulatory costs on the value added of the industry. These models indicate that compliance costs to the pulp and paper manufacturing industry in Ontario would represent less than 1% of the value added of the industry under all three scenarios.

5.3.3.3 Conclusions

As with Kraft Pulp Mills, the newsprint sector is currently in a healthy situation. However, this is a highly competitive sector and the current situation may not last.

Newsprint mills in Ontario now hold a sizeable portion of the newsprint market in the United States. These exports, and the competitiveness of Ontario mills as compared to U.S. mills, are therefore very important to the industry.

The estimated compliance costs for both kraft pulp and sulphite pulp newsprint mills represent up to 2% of the profit on newsprint.

5.3.4 PAPERBOARD MILLS WITH KRAFT PULPING

5.3.4.1 Overview of the Sector

There are a total of 16 paperboard mills in Ontario. Those which will face the highest compliance costs and which may experience financial difficulty in complying with the proposed regulation are paperboard mills with kraft pulping.

The proportion of paperboard which is exported by Ontario and Canadian producers has been growing. Total Canadian paperboard production in 1987 was 2,551,000 tonnes. Of this amount, 27% was exported.

The only company with kraft pulp paperboard mills is Domtar Inc.. Domtar has two such mills. One is located in Cornwall and the other is located in Red Rock, Ontario.

Paperboard is presently selling for between $665 and $700 (delivered in the U.S.) per tonne, or between $765 and $805 Canadian.

5.3.4.2 Compliance Costs for Paperboard Mills with Kraft Pulping

The table on the back of this page presents the compliance cost for this sector.

The total capital cost per paperboard mill to comply will be $5.5 million under scenario A and B, and $4.3 under scenario C. The accompanying annual operating cost per mill will be $0.5 million under scenario A, $0.6 million under scenario B, and $0.4 million under scenario C.

The net present value of these costs per kraft pulping paperboard mill in Ontario is $3.3 million under scenario A, $3.5 million under scenario B, and $2.6 million under

COMPLIANCE COSTS

PAPERBOARD MILLS WITH KRAFT PULPING

($ millions 1986)

COST TYPE \ SCENARIO	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	8.0	8.0	5.6
• per plant	4.0	4.0	2.8
Annual Operating Costs:			
• total sector	0	0.1	0
• per plant	0	0.05	0
Monitoring costs			
Capital cost:			
• total sector	3.0	3.0	3.0
• per plant	1.5	1.5	1.5
Annual Operating Costs:			
• total sector	1.0	1.0	0.8
• per plant	0.5	0.5	0.4
Total:			
Capital cost:			
• total sector	11.0	11.0	8.6
• per plant	5.5	5.5	4.3
Annual Operating Costs:			
• total sector	1.0	1.1	0.8
• per plant	0.5	0.6	0.4
Net Present Value per plant	3.3	3.5	2.6
Uniform Annual Costs per plant	0.5	0.5	0.4

Costs Per Tonne of Paperboard

($ 1986)

COST TYPE \ SCENARIO	A	B	C
Uniform Annual Costs per tonne of paperboard	1.50	1.70	1.20
• as a % of value added of pulp and paper manufacturing	<1%	<1%	<1%
• as a % of selling price	<1%	<1%	<1%

scenario C. The uniform annual costs per mill will be $0.5 million under scenario A and B, and $0.4 million under scenario C.

The current selling price per tonne of paperboard is between $708 and $745 (in 1986 dollars). Compliance costs per tonne as calculated above therefore represent approximately 0.2% of the selling price.

For this segment, the econometric models of Informetrica present a similar picture, predicting that compliance costs to the pulp and paper manufacturing industry in Ontario would represent less than 1% of the value added of the industry under all three scenarios.

5.3.4.3 Conclusions

The impact of regulatory compliance costs appear to be even less severe for paperboard mills, as compared to kraft pulp and newsprint mills.

COMPLIANCE COSTS

FERRO-ALLOY

($ millions 1986)

COST TYPE \ SCENARIO	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	0.5	0.5	0.5
• per plant	0.5	0.5	0.5
Annual Operating Costs:			
• total sector	0	0	0
• per plant	0	0	0
Monitoring costs			
Capital cost:			
• total sector	0.07	0.07	0.07
• per plant	0.07	0.07	0.07
Annual Operating Costs:			
• total sector	0.02	0.02	0.02
• per plant	0.02	0.02	0.02
Total:			
Capital cost:			
• total sector	0.6	0.6	0.6
• per plant	0.6	0.6	0.6
Annual Operating Costs:			
• total sector	0.02	0.02	0.02
• per plant	0.02	0.02	0.02
Net Present Value per plant	0.2	0.2	0.2
Uniform Annual Costs per plant	0.03	0.03	0.03

Compliance Costs Per tonne

($ 1986)

COST TYPE \ SCENARIO	A	B	C
Uniform Annual Costs per tonne	22.00	22.00	22.00
• as a % of value added, iron and steel industry	0.9 to 3.8%	0.9 to 3.8%	1 to 4.8%
• as a % of selling price	<1%	<1%	<1%

5.4 FERRO-ALLOY

Sources contacted for information on the Ontario Ferro-alloy industry include:

- o the Metals and Minerals Directorate of the Department of Regional and Industrial Expansion; and
- o a representative from Ontario's Ferro-alloy company.

5.4.1 OVERVIEW OF THE SECTOR

There is only one ferro-alloy company in Ontario. The materials manufactured by ferro-alloy companies are in short supply at the moment, and companies are currently operating at 100% capacity. Prices for this industry are currently rising, although the cost of raw materials for this industry are also rising dramatically.

The future outlook for this industry is uncertain. Many of their raw materials are obtained from South Africa. The future of the industry may therefore be threatened if the government passes an imbargo on imports from South Africa. The ferro-alloy industry is an intermediate industry, as their products are sold to the Steel industry. The well-being of this industry is therefore greatly dependent upon that of the steel industry.

The company in this Ontario industry does not make a practice of giving out industry information. We were therefore unable to gain any insights from the industry itself.

The selling price for the product of Ontario's one ferro-alloy company is currently $9.00 U.S. a pound in Canada.

5.4.2 COMPLIANCE COSTS

The table on the facing page demonstrates the capital, operating and monitoring costs for this industry to comply with the proposed changes to regulation 308. The total capital cost for compliance for this company will be $0.6 million under scenario A, B and C. In addition, the total annual incremental operating costs for this company will be $0.02 million.

The net present value of these costs to the ferro-alloy company is $0.2 million, and the uniform annual cost is $0.03 million.

The price per tonne is $19,800.00 U.S., or approximately $22,770.00 Canadian a tonne ($21,064 in 1986 dollars). The uniform annual cost per tonne represents 0.1% of the selling price.

Because the ferro-alloy industry is only one component of the iron and steel industry, these numbers may not accurately reflect the impact of compliance costs on the value added of the industry.

The percentage of value added which compliance costs would represent to the iron

and steel industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- o scenario A and B: from 1% in 1989 to 3.8% in 2005;
- o scenario C: from 1% in 1989 to 4.8% in 2005.

The econometric models of Informetrica indicate that compliance costs will have a very significant impact upon the steel industry (up to 3.8% of the value added). However, included in the "Steel industry" category are other sub-sectors such as Steel Foundries and Other Primary Steel.

5.4.3 CONCLUSIONS

The estimated compliance costs are less than one-half of one percent of the selling price, per tonne, of the final product but are up to 3.8% of the value added. However, there is insufficient information available to assess the implications for this one company of the proposed amendments.

5.5 FOUNDRIES

Sources contacted for information on the Ontario foundries industry include:

- the Metals and Minerals Directorate of the Department of Regional and Industrial Expansion, in particular their industry profile of the ferrous foundries industry in Canada (1988); and
- the MISA industry profile.

The Canadian Foundries Association vehemently declined to give us any industry information. The association was not aware that the Ministry was undertaking such a study at this time. If we are to obtain any information from the association, we must make a formal, written request. The supply of any information by this association will be dependent upon the approval of member companies. The association strongly suggested that we not contact any companies as we will not be favourably received.

5.5.1 OVERVIEW OF THE SECTOR

The Foundries industry in Ontario consists of a very large number of companies with varied sizes and specialties. We have grouped a number of SIC's together for this sector. These SIC's and the number of plants involved with each are:

- SIC 2941: Iron Foundries, with 61 plants in Ontario;
- SIC 2971: Copper Rolling, Casting and Extruding, with 23 plants in Ontario;
- SIC 2999: Other Metal Rolled Casting, etc., with 63 plants in Ontario;
- SIC 2912: Steel Foundries, with 24 plants in Ontario.

The foundry industry is to a great extent an intermediate industry, and its welfare will depend upon that of the industry to which it is a supplier. For example, the automotive industry represents an estimated 65% share of the iron castings consumption in Ontario, and railways represent 50% of the market for steel castings. The non-ferrous foundries industry supplies castings to automotive, plumbing, and appliance industries.

About 75% of the plants are privately owned, and there are nearly 2.5 times more jobbing plants than captive plants. The plants in this industry are typically very small, with nearly one-half of individual plants being privately owned jobbing plants with fewer than 50 employees.

Approximately 52% of all ferrous foundries in Canada are located in Ontario. The majority of these companies are Canadian-owned, but due to the large size of those which are foreign owned (i.e., the automotive industry foundries), approximately half of production capacity is foreign-owned.

According to the Department of Regional Industrial Expansion, it is impossible to make many generalizations for this industry; there are no rules concerning costs and profitability that apply across the entire sector. In this industry, companies

tend to be very specialized and to have their own market niche. Therefore, all foundry companies in Ontario are not in competition amongst themselves.

The various firms in this sector use different processes. In fact, it is not uncommon for one company to produce castings using two completely different processes (for example, sand casting, permanent mold casting) in the same plant. It is impossible to make any generalizations about the costs of this industry, as different costs and prices are associated with different processes.

According to an industry profile of ferrous foundries prepared by Roland Bodie of DRIE, the key factors affecting the competitiveness of Canadian ferrous foundries include:

- o economies of scale;
- o labour costs;
- o raw material costs;
- o transportation costs;
- o quality of product;
- o customer service, reliability, and prompt delivery.

The technology used by the Canadian ferrous foundries industry is equally modern and efficient as that used by American and European ferrous foundries industries. Canada is able to compete successfully in the northern U.S.. However, newly industrialized countries represent a significant threat to the Ontario industry. These countries have lower labour and regulatory costs, and they are able to deliver their castings to Canada at a price which Ontario foundries are unable to compete with. As a result, the volume of castings imported from such countries has increased dramatically since 1980. A significant proportion of iron and steel castings produced in Ontario are exported to the United States. DRIE representatives estimate that about 60% of iron castings, and 25% of steel castings were exported, whether as castings or as part of other equipment, in 1986. Close to 98% of this amount is exported to the United States; mainly to the northern states. Exports elsewhere are largely limited by high transportation costs. Slightly more than 25% of castings consumed in Canada are imported.

Technological advances in this industry are frequently made. These are necessary to minimize production costs and to supply products which meet the tolerance levels which are demanded by customers. The MISA profile states that in order to maintain a cost advantage over any substitute materials, producers must invest in new technologies and undertake extensive new product development.

There appears to be considerable under-utilized production capacity in Ontario. According to DRIE representatives, the steel foundry industry operated at an average capacity of 50-55% from 1983-1986, and the iron foundry industry operated at an average capacity of between 60-65%.

Another indication of the competition which exists in this industry is the decline in the number of North American metal casting plants from year to year. The number of plants in this industry has declined due to industry rationalization. The number of metal casting plants in North America in 1971 was 5,254. The number of North American plants dropped from 4,645 in 1980, to 4,006 in 1986. Increased automation

COMPLIANCE COSTS

IRON FOUNDRIES

($ millions 1986)

COST TYPE \ SCENARIO	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	57.4	57.4	55.2
• per plant	0.9	0.9	0.9
Annual Operating Costs:			
• total sector	-0.5	-0.5	0.7
• per plant	-0.008	-0.008	0.01
Monitoring costs			
Capital cost:			
• total sector	17.1	17.1	17.1
• per plant	0.3	0.3	0.3
Annual Operating Costs:			
• total sector	12.8	12.8	10.1
• per plant	0.2	0.2	0.2
Total:			
Capital cost:			
• total sector	74.5	74.5	72.3
• per plant	1.2	1.2	1.2
Annual Operating Costs:			
• total sector	12.3	12.3	10.8
• per plant	0.2	0.2	0.2
Net Present Value per plant	1.1	1.1	1.0
Uniform Annual Costs per plant	0.15	0.15	0.14

Costs Per tonne

($ 1986)

COST TYPE \ SCENARIO	A	B	C
Uniform Annual Costs per tonne	5.90	5.90	5.20
• as a % of value added of foundries industry	1 to 4.7%	1 to 4.8%	0.9 to 4.1%

and use of capital equipment has led to an increase in productivity and output of the foundries which have remained in business.

Metal castings are also facing increasing competition from other materials such as plastic and ceramics, which are replacing metal castings in some instances. The industry is also experiencing a loss of demand for metal castings from some traditional industries such as agricultural equipment, shipbuilding and railway rolling stock.

As we have already mentioned, it is impossible to make many generalizations about the foundries industry. To do any more research on the costs, profitability, prices, competitiveness within the foundries industry, it would be necessary to do a detailed analysis on a process, and product basis for the industry. Such a study is clearly beyond the scope of this project.

The profit margins in the metal castings industry are generally poor. According to the MISA profile, cost of goods sold typically range from 70% to 90%, but can also reach 95%, depending to a large extent on how labour-intensive operations are.

Financial information is not available for companies representative of this sector. Published financial information is only available for the large companies of this sector, and such information would not be representative of all companies in the industry. However, Statistics Canada shows that 1984 shipments by ferrous foundries totalled $966 million for 1.3 million tonnes, and that the 1984 profits after taxes for the industry were $30 million. Therefore, profits in 1984 were 3% of shipments.

Statistics Canada 1985 information on the Ontario copper rolling casting and extruding industry is as follows (in thousands of dollars):

- value of shipments: $273,371
- value added: $103,356
- cost of materials: $154,218
- cost of fuel and electricity: $8,866
- salaries and wages: $54,150

Statistics Canada 1985 information on the Ontario Other Metal Rolled Castings is as follows (thousands of dollars):

- value of shipments: $748,113
- value added: $307,532
- cost of materials: $420,138
- salaries and wages: $129,257
- cost of fuel and electricity: $23,257

5.5.2 COMPLIANCE COSTS

IRON FOUNDRIES:

The facing table demonstrates the costs for the iron foundries of Ontario to comply with proposed changes to Regulation 308.

COMPLIANCE COSTS

COPPER ROLLING, CASTING AND EXTRUDING

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	11.8	11.8	11.8
• per plant	0.5	0.5	0.5
Annual Operating Costs:			
• total sector	2.4	2.4	1.4
• per plant	0.1	0.1	0.06
Monitoring costs			
Capital cost:			
• total sector	4.8	5.0	4.8
• per plant	0.2	0.2	0.2
Annual Operating Costs:			
• total sector	2.2	2.2	1.6
• per plant	0.1	0.1	0.07
Total:			
Capital cost:			
• total sector	16.6	16.8	16.6
• per plant	0.7	0.7	0.7
Annual Operating Costs:			
• total sector	4.6	4.6	3.0
• per plant	0.2	0.2	0.1
Net Present Value per plant	1.0	1.0	0.7
Uniform Annual Costs per plant	0.1	0.1	0.1

Costs Per tonne
($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Costs per tonne	39.50	39.50	29.30
• as a % of value added of foundries industry	1 to 4.7%	1 to 4.8%	0.9 to 4.1%

This illustrates that the capital cost per plant would be $1.2 million under all scenarios. In addition, the annual operating costs for iron foundries would be $0.2 million under all three scenarios.

The net present value of these costs per iron foundry in Ontario is $1.1 million per foundry under scenario A and B, and $1 million under scenario C. The uniform annual cost per foundry is $0.15 million under scenario A and B, and $0.14 million under scenario C.

Dividing the dollar value of shipments by the number of tonnes shipped in 1986, we find that the approximate average value per tonne in the ferrous foundries industry is about $768 (in 1986 dollars). Compliance costs represent approximately 0.8% of this amount. Profit margins in this industry are not very high. Statistics Canada information demonstrates that profits after tax in 1984 represented 5.1% of total sales, and 3% of the dollar value of shipments. Using statistics obtained on profits after tax, value of shipment, and tonnes shipped, the profit per tonne shipped by ferrous foundries appears to be very roughly $23 per tonne. Compliance costs would represent 26% of this profit.

The econometric models of Informetrica indicate that compliance costs to the foundries industry in Ontario could represent up to 4.8% of the value added of the industry under scenario B. The foundries industry heading includes iron foundries, copper rolling and casting, and other rolled castings.

The percentage of value added which compliance costs would represent to the foundries industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- scenario A: from 1.1% in 1989 to 4.7% in 2005;
- scenario B: from 1.1% in 1989 to 4.8% in 2005;
- scenario C: from 1% in 1989 to 4.2% in 2005.

The foundries industry classification used by Informetrica includes Copper casting, iron foundries, and rolled castings. Therefore these value added percentages may not accurately represent the impact of compliance costs on the iron foundries in Ontario.

COPPER AND BRASS:

The compliance costs for this sector are presented on the facing table.

The total abatement and monitoring capital cost per plant for this SIC is approximately $0.7 million under scenario all three scenarios. In addition to this capital cost, the annual operating cost per plant would be $0.2 million under scenario A and B, and $0.1 million under scenario C.

The net present value of these costs per copper foundry would be $1 million under scenario A and B, and $0.7 million under scenario C.

This represents a uniform annual cost per tonne of approximately $40 under scenarios A and B, and $29 per tonne under scenario C.

COMPLIANCE COSTS

OTHER METAL ROLLING, CASTING, ETC.

($ millions 1986)

COST TYPE \ SCENARIO	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	46.1	46.1	34.6
• per plant	0.7	0.7	0.5
Annual Operating Costs:			
• total sector	10.9	10.9	10.9
• per plant	0.2	0.2	0.2
Monitoring costs			
Capital cost:			
• total sector	10.3	10.3	10.3
• per plant	0.2	0.2	0.2
Annual Operating Costs:			
• total sector	5.6	5.6	4.2
• per plant	0.09	0.09	0.02
Total:			
Capital cost:			
• total sector	56.4	56.4	44.9
• per plant	0.9	0.9	0.7
Annual Operating Costs:			
• total sector	16.5	16.5	15.1
• per plant	0.3	0.3	0.2
Net Present Value per plant	1.3	1.3	1.2
Uniform Annual Costs per plant	0.2	0.2	0.2

Costs Per tonne
($ 1986)

COST TYPE \ SCENARIO	A	B	C
Uniform Annual Costs per tonne	150.00	150.00	135.00
• as a % of value added, of the foundries industry	1 to 4.7%	1 to 4.8%	0.9 to 4.2%

The econometric models of Informetrica indicate that compliance costs to the foundries industry in Ontario could represent up to 4.8% of the value added of the industry under scenario B. The foundries industry heading includes iron foundries, copper rolling and casting, and other rolled castings. Due to the range of industries included in this econometric modelling, the following numbers may not accurately reflect the impact on value added of the copper casting industry only.

The percentage of value added which compliance costs would represent to the foundries industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- scenario A: from 1.1% in 1989 to 4.7% in 2005;
- scenario B: from 1.1% in 1989 to 4.8% in 2005;
- scenario C: from 1% in 1989 to 4.2% in 2005.

These results suggest that compliance costs will have a significant impact on this sector.

ROLLED CASTINGS:

The costs for this sector are presented in the table on the facing page.

The total capital per plant cost for rolled castings plants to comply with Regulation 308 would be $0.9 million under scenario A and B, and $0.7 million under scenario C. The corresponding annual operating cost per plant would be $0.3 million per plant under scenario A and B, and $0.2 million annually under scenario C.

The net present value of these costs per foundry is $1.3 million under scenario A and B, and $1.2 million under scenario C. The uniform annual cost per foundry is $0.2 million under all three scenarios.

The uniform annual cost per tonne is about $150 under scenario A and B, and $135 under scenario C.

The econometric models of Informetrica indicate that compliance costs to the foundries industry in Ontario could represent up to 4.8% of the value added of the industry under scenario B. The foundries industry heading includes iron foundries, copper rolling and casting, and other rolled castings.

As noted above, the percentage of value added which compliance costs would represent to the foundries industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- scenario A: from 1.1% in 1989 to 4.7% in 2005;
- scenario B: from 1.1% in 1989 to 4.8% in 2005;
- scenario C: from 1% in 1989 to 4.2% in 2005.

These costs are potentially significant.

STEEL FOUNDRIES:

COMPLIANCE COSTS

STEEL FOUNDRIES

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	446.1	446.1	357.0
• per plant	18.6	18.6	14.9
Annual Operating Costs:			
• total sector	53.3	53.3	95.0
• per plant	2.2	2.2	4.0
Monitoring costs			
Capital cost:			
• total sector	21.7	21.7	21.7
• per plant	0.9	0.9	0.9
Annual Operating Costs:			
• total sector	8.7	8.7	7.0
• per plant	0.4	0.4	0.3
Total:			
Capital cost:			
• total sector	467.8	467.8	378.7
• per plant	19.5	19.5	15.8
Annual Operating Costs:			
• total sector	62.0	62.0	102.0
• per plant	2.6	2.6	4.3
Net Present Value per plant	15.1	15.1	21.8
Uniform Annual Costs per plant	2.1	2.1	3.0

Costs Per tonne

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Costs per tonne	4.00	4.00	6.00
• as a % of value added of the iron and steel industry	1 to 3.8%	1 to 3.8%	1 to 4.8%

The tables on the back of this page presents the sector's compliance costs.

The total per plant capital cost to comply will be $19.5 million under scenario A and B, and $15.8 million under scenario C. The accompanying annual operating costs will be $2.6 million per plant under scenario A and B, and $4.3 per plant under scenario C.

The net present value of these costs per foundry is $15.1 million under scenario A and B, and $21.8 million under scenario C. The uniform annual costs per foundry will be $2.1 million under scenario A and B, and $3 million per foundry under scenario C.

The uniform annual cost per tonne is about $4 per tonne under scenario A and B, and $6 under scenario C.

Dividing the dollar value of shipments by the number of tonnes shipped in 1986, we find that the approximate average value per tonne in the ferrous foundries industry is about $768 (in 1986 dollars). Compliance costs represent approximately 0.8% of this amount. Profit margins in this industry are not very high. Statistics Canada information demonstrates that profits after tax in 1984 represented 5.1% of total sales, and 3% of the dollar value of shipments. Using statistics obtained on profits after tax, value of shipment, and tonnes shipped, the profit per tonne shipped by ferrous foundries appears to be very roughly $23 per tonne. Compliance costs would represent 26% of this profit.

The econometric models of Informetrica indicate that compliance costs to the Ontario iron and steel industry could represent up to 4.8% of the value added of the industry under scenario C. This suggests that the impact of compliance costs on this sector will be significant. However, included in Informetrica's "iron and steel industry"

The percentage of value added which compliance costs would represent to the iron and steel industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- scenario A and B: from 1% in 1989 to 3.8% in 2005;
- scenario C: from 1% in 1989 to 4.8% in 2005.

5.5.3 CONCLUSIONS

This sector is characterized by low profit margins and strong competition, although there are probably exceptions to this rule. The imposition of any additional costs, not borne by this sector's competitors in the rest of Canada and the United States, could be expected to have serious effects on the Ontario companies.

This conclusion is supported by the findings of Informetrica's models. Over 4% of value added may represent a very significant portion of the return on investment of these industries.

5.6 NON-FERROUS SMELTERS

5.6.1 OVERVIEW OF THE SECTOR

There are 13 primary smelters in Ontario, and 3 lead smelters. These two categories of smelters together make up the non-ferrous smelters industry.

The mining industry in Ontario comprises mainly companies which are vertically integrated, according to the MISA profile.

Although Canada is a major producer of base metals, we are essentially price takers in the global marketplace. According to the MISA profile, prices in the metals industry have been declining in recent times. A few reasons for the decline in metal prices include:

- o competition from non-metal materials (such as fibre optics in the case of copper);
- o state-controlled mining operations in third world companies have maintained or increased production in a time when there exists excess supply.

Financial information on some of these companies is available from the July edition of the *Globe and Mail* Report on Business Magazine.

Agnico Eagle Mines:

- o 1987 profit of $9.7 million; an 87% increase from 1986;
- o 1987 revenue of $58.4 million; a 30% increase from 1986.

Falconbridge:

- o 1987 profits of $29.7 million;
- o 1987 operating revenues of $1.3 billion; a 17% increase from 1986;
- o 1987 capital expenditures of $122 million.

Inco:

- o 1987 profits of $125 million, a 70,658% increase from 1986;
- o 1987 operating revenues of $1.8 billion; a 23% increase from 1986;
- o 1987 capital expenditures of $138 million.

Kidd Creek Mines: 100% owned by Falconbridge

- o 1987 profit not available;
- o 1987 revenues of $613 million;

COMPLIANCE COSTS

PRIMARY SMELTERS

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	177.0	177.0	100.0
• per plant	13.6	13.6	7.7
Annual Operating Costs:			
• total sector	0	0	-0.2
• per plant	0	0	-0.015
Monitoring costs			
Capital cost:			
• total sector	42.8	42.8	42.8
• per plant	3.3	3.3	3.3
Annual Operating Costs:			
• total sector	20.4	20.4	15.2
• per plant	1.6	1.6	1.2
Total:			
Capital cost:			
• total sector	219.8	219.8	142.8
• per plant	16.9	16.9	11.0
Annual Operating Costs:			
• total sector	20.4	20.4	15.0
• per plant	1.6	1.6	1.2
Net Present Value per plant	10.1	10.1	7.2
Uniform Annual Costs per plant	1.4	1.4	1.0

Costs Per Tonne

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Costs per tonne	24.00	24.00	17.00
• as a % of value added of non-ferrous smelters	2.2 to 8.4%	2.2 to 8.4%	1.5 to 6.2%

Noranda:

- o 1987 profit of $343 million; a 692% increase from 1986;
- o 1987 revenue of $7.4 billion; a 19% increase from 1986.

Timminco:

- o 1987 profit of $3.6 million; a 10% increase from 1986;
- o 1987 revenue of $86.6 million; a 10% decrease from 1986.

The remaining companies for which we do not have any financial information are:

- o Ampere Metal Furnishing Ltd.;
- o ELdorado Resources Ltd.;
- o Fisher Gauge Ltd.;
- o Montreal Bronze Foundry; and
- o Zigman Metals.

Metal prices as of March, 1988 were as follows:

- o copper: 119.04 cents to 156.45 cents per pound;
- o nickel: 8.08 cents per pound;
- o alumiaum: 131.79 cents to 143.14 cents per pound;
- o silver: 733.69 cents to 826.99 cents per ounce;
- o zinc: 63 cents per pound;
- o lead: 43 cents per pound.

5.6.2 COMPLIANCE COSTS

PRIMARY SMELTERS:

The facing table illustrates the compliance costs for primary smelters to comply with Regulation 308.

This table demonstrates that the total capital cost for each smelter to comply would be $16.9 million under scenario A and B, and $11 million under scenario C. The accompanying annual operating costs for abatement and monitoring would be $1.6 million per plant under scenario A and B, and $1.2 million under scenario C.

The net present value of these costs per primary smelter in Ontario is $10.1 million under scenario A and B, and $7.2 million under scenario C.

The uniform annual cost per tonne of $24 per tonne under scenario A and B, and $17 under scenario C.

These costs per tonne represent varying percentages of the selling price per tonne of metal, depending on the type of metal. Compliance costs as a percentage of the selling price (after converting prices to 1986 dollars), for a few selected metals are:

- o copper: compliance costs for scenarios A and B represent between 0.8% and 1% of the selling price of copper;
- o nickel: compliance costs for scenarios A and B represent 15% of he selling price per tonne of nickel;

COMPLIANCE COSTS

LEAD SMELTERS

($ millions 1986)

COST TYPE \ SCENARIO	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	0	0	0
• per plant	0	0	0
Annual Operating Costs:			
• total sector	0	0	0
• per plant	0	0	0
Monitoring costs			
Capital cost:			
• total sector	17.2	17.2	17.2
• per plant	5.7	5.7	5.7
Annual Operating Costs:			
• total sector	8.1	8.1	6.1
• per plant	2.7	2.7	2.0
Total:			
Capital cost:			
• total sector	17.2	17.2	17.2
• per plant	5.7	5.7	5.7
Annual Operating Costs:			
• total sector	8.1	8.1	6.1
• per plant	2.7	2.7	2.0
Net Present Value per plant	13.0	13.0	10.1
Uniform Annual Cost per plant	1.8	1.8	1.4

Costs Per tonne

($ 1986)

COST TYPE \ SCENARIO	A	B	C
Uniform Annual costs per tonne	58.00	58.00	45.00
• as a % of value added of non-ferrous smelters	2.2 to 8.4%	2.2 to 8.4%	1.5 to 6.2%

- o aluminum: compliance costs for scenarios A and B represent between 0.8% and 0.9% of the selling price;
- o silver: compliance costs per tonne for scenarios A and B represent 0.01% of the selling price;
- o zinc: compliance costs per tonne under scenarios A and B represent 1.9% of the selling price per tonne.

The econometric models of Informetrica indicate that compliance costs to the non-ferrous smelters industry in Ontario could represent up to 8.4% of the value added of the industry. Grouped under the non-ferrous smelters industry heading are primary smelters and lead smelters.

The percentage of value added which compliance costs would represent to the non-ferrous smelters industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- o scenario A and B: from 2.2% in 1989, to 8.4% in 1995, to 8.3% in 2005;
- o scenario C: from 1.5% in 1989, to 6.2% in 2005.

LEAD SMELTERS:

The facing table demonstrates the compliance costs for lead smelters.

There are no incremental capital or operating abatement costs for lead smelters to comply. However, the monitoring costs to the industry are significant. The total monitoring capital cost per plant is $5.7 million under all three scenarios. The accompanying annual operating costs per plant are $2.7 million under scenario A and B, and $2 million per plant under scenario C.

The net present value of these costs per lead smelter is $13 million under scenario A and B, and $10.1 million under scenario C. The uniform annual cost per smelter is $1.8 million under scenario A and B, and $1.4 million under scenario C.

The uniform annual cost per tonne is $58 under scenario A and B, and $45 per tonne under scenario C.

The current selling price of lead, converted to 1986 dollars, is $875. Compliance costs represent between 5% and 6.6% of this selling price.

The econometric models of Informetrica indicate that compliance costs to the non-ferrous smelters industry in Ontario could represent up to 8.4% of the value added of the industry. Grouped under the non-ferrous smelters industry heading by Informetrica are both primary smelters and lead smelters. This is a very significant proportion of this industry's value added.

The percentage of value added which compliance costs would represent to the non-ferrous smelters industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- o scenario A and B: from 2.2% in 1989, to 8.4% in 1995, to 8.3% in 2005;
- o scenario C: from 1.5% in 1989, to 6.2% in 2005.

5.6.3 CONCLUSIONS

The metals industry in Canada is fiercely competitive. A significant proportion of shipments are exported, and producers in Canada are in a price taking position, as prices are set in the global marketplace.

Compliance costs represent a significant proportion of the selling price of metals, with the exception of silver. The econometric modelling of Informetrica confirms that compliance costs will have a significant impact on the non-ferrous smelters industry in Ontario.

5.7 AUTOMOTIVE INDUSTRY

5.7.1 AUTOMOTIVE AND LIGHT DUTY TRUCK SURFACE COATING

Sources contacted for information on automotive and light duty truck surface coating include:

- the Federal Department of Regional Industrial Expansion;
- the Automotive Parts Manufacturers Association;
- the Motor Vehicle Manufacturers Association;
- representatives from the automotive industry; and
- the report "Best Available Control Technology" by the South Coast Air Quality Management district. (1983)

5.7.1.1 Overview of the Sector

There is a total of 212 automotive and light duty truck surface coating plants in Ontario which have been included for study in this project. These coating plants are the plants of automobile manufacturers in Ontario, and those of their suppliers. For example, suppliers might include plants which supply already painted bumpers to General Motors or Ford. Coating plants which have not been included in this project are auto body shops across Ontario which are engaged in automotive painting. Although the auto body shops produce the same emissions as other surface coating plants, they have not been included in this project due to time and budget constraints.

A representative of the Motor Vehicle Manufacturers Association stated that the surface coating costs will likely show wide variation among plants, as the technology in use at plants in Ontario varies. Furthermore, the costs for coating may change in the future as plants may convert to water based paints.

There are various ways of reducing the emissions of coating plants, each method having its own costs. The main methods are as follows:

- conversion to water-based paints;
- afterburners, which removes close to 99% of solvents in the paint;
- flocoat or roller coat, which reduces solvents by 95%;
- electrostatic discs, which reduces solvents by 95%;
- electrophoretic dip, prime coat, which reduces solvents by 100%;
- electrostatic airless, which reduces solvents by 80%; and
- electrostatic air, which reduces solvents by 65%.

These solvent reduction methods were taken from a 1983 report on Best Available Control Technology prepared by South Coast Air Quality Management District (SCAQMD) of California.

Industry estimates of the current cost of painting cars, trucks, and vans, in a plant using the most modern base coat and clear coat technology is as follows:

COMPLIANCE COSTS

AUTOMOTIVE AND LIGHT DUTY TRUCK SURFACE COATING

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	111.0	1,483.1	94.8
• per plant	0.5	7.0	0.5
Annual Operating Costs:			
• total sector	16.0	8.0	13.1
• per plant	0.08	0.04	0.06
Monitoring costs			
Capital cost:			
• total sector	2.0	1.9	2.0
• per plant	0.009	0.009	0.009
Annual Operating Costs:			
• total sector	1.3	4.0	0.3
• per plant	0.006	0.02	0.001
Total:			
Capital cost			
• total sector	113.0	1,485.0	96.8
• per plant	0.5	7.0	0.5
Annual Operating Costs:			
• total sector	17.3	12.0	13.4
• per plant	0.08	0.06	0.06
Net Present Value per plant	0.5	1.6	0.4
Uniform Annual Costs per plant	0.06	0.2	0.05

Compliance Costs Per car painted

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Costs per car	6.40	21.00	5.00
• as a % of value added, automotive industry	<1%	1.4 to 4.7%	<1%
• as a % of coating costs per car	4%	13%	3%

- o trucks: $150-$170;
- o cars: $120-$150;
- o vans: $150-$200.

The costs for surface coating a car may be much lower in an older plant using acrylic technology. Costs per vehicle may be as low as $75 in some cases.

The costs of converting a plant to water based paints can vary widely, from about $50 to $300 million. The costs for conversion will vary widely according to the size of plant and the extent of the changes made.

Ford has just recently completed a $100 million paint shop at its plant in St. Thomas, Ontario. Ford paid for this new equipment itself, without having to seek government or other financing. The painting process used with this new equipment is one of two component urethane clearcoat, which achieves a superior finish.

5.7.1.2 Compliance Costs

The facing table presents the costs for the Ontario automotive and light duty truck surface coating industry to comply with Regulation 308.

The total capital cost per plant for abatement and monitoring will be about $0.5 million per plant under scenario A and C, and $7 million per plant under scenario B. The accompanying annual operating costs would be approximately $0.08 million per plant under scenario A, and $0.06 million under scenario B and C.

The net present value of these costs to each surface coating plant in Ontario is $0.5 million per plant under scenario A, $1.6 million under scenario B, and $0.4 million under scenario C. The uniform annual costs per plant will be $0.06 million per plant under scenario A, $0.2 under scenario B, and $0.05 under scenario C.

The uniform annual cost per car painted would be about $6.40 per car under scenario A, $21 per car under scenario B, and $5 per car painted under scenario C.

The compliance costs for scenario B are much higher than other scenarios for this industry due to the fact that scenario B costs have been calculated assuming that plants would have to control fugitive emissions as well.

In comparing given compliance costs with the cost of surface coating a car in 1986 dollars, compliance costs represent 4% of the coating cost for scenario A, 13% of the cost for scenario B, and about 3% of the coating cost under scenario C.

The econometric models of Informetrica were used to estimate the impacts of these compliance costs on the overall Ontario automotive industry, and found that costs could represent up to 4.7% of the value added of the industry under scenario B. The percentage of value added which compliance costs would represent to the automotive industry in Ontario between 1989 and 2005 is as follows under all three scenarios:

- o scenario A: 0.3% in 1989, to 0.95% from 1995 to 1998, and 0.9% in 2005;
- o scenario B: 1.4% in 1989, to 4.7% in 1995, to 3.6% in 2005;

- o scenario C: 0.2% in 1989, to about 0.7% from 1997 to 2005.

The industry might receive some benefits from emission controls in that any solvents recovered could be re-cycled and re-used.

5.7.1.3 Conclusions

The proposed compliance costs (especially scenario B) would represent a significant cost to plants involved in automotive surface coating. Although currently riding high, this industry is already facing massive re-structuring and adjustment costs in the face of intense international competition. Conversations with industry and association representatives have shown that these plants will have a number of alternatives methods available to reduce their emissions. Technological developments in the field of water based paints may significantly reduce compliance costs for automotive coating plants.

This study has not examined the impacts of the proposed regulations on the independent automotive paint shops, e.g., auto body repair shops. However, if the shops were to be subjected to the same control levels as proposed, then it can be expected that the costs would pose significant difficulties for many of them. On the other hand, these shops may also be in a situation to pass on any such costs to their customers, provided that all such shops were subject to the same controls.

5.7.2 AUTOMOTIVE BATTERIES

Sources used to obtain information for the automotive battery industry include:

- o the Motor Vehicle Manufacturers Association;
- o the Automotive Parts Manufacturers Association; and
- o industry representatives from replacement battery companies in Ontario.

5.7.2.1 Overview of the Sector

The Ontario Automotive battery industry comprises five plants. The industry consists of the General Motors captive battery plant, and a number of smaller businesses which serve the replacement market. Only General Motors supplies batteries to new cars. Other automobile manufacturers in Ontario have their batteries made in the United States.

The replacement battery industry is extremely competitive. Ontario companies face competition from the United States and the Asian Rim (South Korea, Taiwan, etc.). Competition is based on both price and quality, although price is the major factor. Ontario companies currently hold a price setting position in the Canadian market, as Ontario companies to a large degree are able to determine what price their batteries sell for. This situation may change however. The industry is to a large extent labour-intensive, and offshore producers such as Korea have much lower labour costs. The price setting position which Ontario companies now hold may well change as offshore producers expand into the mainstream of the market.

Ontario companies cannot be considered leaders in technology, with the exception of the General Motors plant, which is mechanized. Ontario companies are mainly labour-intensive operations which are in need of some modernization. However, as

COMPLIANCE COSTS

AUTOMOTIVE BATTERIES

($ millions 1986)

COST TYPE \ SCENARIO	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	8.3	8.3	5.9
• per plant	1.0	1.0	0.7
Annual Operating Costs:			
• total sector	0	0	0
• per plant	0	0	0
Monitoring costs			
Capital cost:			
• total sector	5.6	5.6	5.6
• per plant	0.7	0.7	0.7
Annual Operating Costs:			
• total sector	2.7	2.7	2.0
• per plant	0.3	0.3	0.3
Total:			
Capital cost:			
• total sector	13.9	13.9	11.5
• per plant	1.7	1.7	1.4
Annual Operating Costs:			
• total sector	2.7	2.7	2.0
• per plant	0.3	0.3	0.3
Net Present Value per plant	1.8	1.8	1.4
Uniform Annual Cost per plant	0.3	0.3	0.2

Compliance Costs Per Battery

($ 1986)

COST TYPE \ SCENARIO	A	B	C
Uniform Annual costs per battery	0.27	0.27	0.20
• as a % of value added, automotive industry	<1%	1.4 to 4.7%	<1%
• as a % of price	<1%	<1%	<1%
• as a % of production cost	1.1%	1.1%	0.8%

price competition has been increasing, and profit margins in this industry are relatively low, companies have not had an abundance of capital with which to fund modernization.

Exports in this market are relatively low. Some batteries are exported to the United States, and this export market will likely expand if free trade becomes a reality. One of Ontario's battery companies is West German-owned, and this company exports batteries to Europe.

An industry representative estimated that the cost of producing a battery in Ontario in the labour intensive replacement industry is approximately $25.00.

5.7.2.2 Compliance Costs

The facing table illustrates the compliance costs for the automotive battery industry in Ontario to comply to proposed changes to Regulation 308.

The total capital cost per plant will be approximately $1.7 million under scenario A and B, and $1.4 million under scenario C. The cost per plant per year for annual operating costs would be $0.3 million under all three scenarios.

The net present value of these costs per plant is $1.8 million under scenario A and B, and $1.4 million under scenario C. The uniform annual costs per plant will be $0.3 million under scenario A and B, and $0.2 million under scenario C.

The uniform annual cost per battery is approximately $0.27 under scenario A and B, and about $0.20 under scenario C. These amounts represent between 0.8% and 1.1% of the production cost per battery in 1986 dollars.

As noted above, the econometric models of Informetrica indicate that compliance costs to the entire automotive industry in Ontario could represent up to 4.7% of the value added of the industry under scenario B. However, this estimate covers a much broader sector than just batteries.

5.7.2.3 Conclusions

The costs of compliance would seem to be small for this sector. However, even a 3% increase in manufacturing costs can translate into a significant drop in profits if the margins are small.

The captive plants may have some flexibility in passing on at least a part of the increased costs. However, the replacement battery market may have difficulty in either absorbing the increased cost or in passing it on to its clients in such a competitive market.

5.8 DOMESTIC CLAY PRODUCTS

Sources contacted for information on the domestic clay products industry include:

- o industry representatives from various Ontario companies;
- o the Federal Ministry of Energy, Mines and Resources;
- o author of a publication entitled: "Clay and Shale Industries of Ontario", which was published by the Ontario Ministry of Natural Resources in 1987.

The Domestic Clay industry in Ontario comprises 26 companies in total. These companies are involved in the production of a variety of clay products. This section will examine these product sectors individually.

5.8.1 THE ONTARIO BRICK INDUSTRY

5.8.1.1 Overview of the Sector

There are now 8 brick plants in Ontario, which are operated by 3 companies:

- o Brampton Brick: with plants in Brampton and Don Valley;
- o Canada Brick: with five plants in Ontario; and
- o Hamilton Brick Ltd..

New brick plants are currently being planned for the Toronto area. These new plants will be thoroughly modern and efficient in terms of fuel use and environmental protection. This will likely result in the closure of older, less efficient plants.

The brick industry in Ontario has been subject to wide swings in consumption over time. These swings in sales reflect both changing technology and the changing patterns of use of bricks.

The number of brick manufacturers in Ontario has declined steadily through industry rationalization. This rationalization has occurred with advances in technology, high quality demands, and the improved efficiency of larger plants, which has reduced the number of producers needed to meet the demand for facing bricks.

Although bricks manufactured in Ontario are still referred to as clay bricks, brick manufacturing in Ontario is entirely from shale because of the generally inferior quality of surface clay in Ontario. Shale lands in Ontario are almost exclusively restricted to the Toronto-Hamilton, and Niagara Escarpment areas.

Fuel is a major element in the costs of brick production. In the past thirty years, brick producers have switched from oil to using natural gas in their operations, thereby significantly reducing the stack emissions from kilns. The industry review published by the Ontario Ministry of Natural Resources refers to today's brickyards as highly modern and automated operations which cause minimal disturbance to the environment.

COMPLIANCE COSTS

DOMESTIC CLAY

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	24.1	24.1	24.1
• per plant	0.9	0.9	0.9
Annual Operating Costs:			
• total sector	0.9	0.9	0.9
• per plant	0.04	0.04	0.04
Monitoring costs			
Capital cost:			
• total sector	13.8	13.8	3.8
• per plant	0.5	0.5	0.2
Annual Operating Costs:			
• total sector	5.2	5.2	4.0
• per plant	0.2	0.2	0.2
Total:			
Capital cost:			
• total sector	37.9	37.9	27.9
• per plant	1.5	1.5	1.1
Annual Operating Costs:			
• total sector	6.1	6.1	4.9
• per plant	0.2	0.2	0.2
Net Present Value per plant	1.3	1.3	1.0
Uniform Annual Cost per plant	0.2	0.2	0.1

Costs Per tonne

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Cost per tonne	3.00	3.00	2.00
• as a % of value added of the non-metallic minerals industry	2.3 to 9.1%	2.3 to 9.1%	1.9 to 7.8%
• as a % of selling price (bricks)	2.2%	2.2%	1.7%

The average useful life of a brick plant is up to 50 years. The construction of a new brick plant is now approximately 15 to 18 million dollars. To be economically viable, any new brick plant in Ontario should be located within 80 kilometers of Metropolitan Toronto. Bricks from the Toronto area are shipped throughout the province and even to Quebec; however, most are consumed within an 80 kilometre radius of the plant.

The demand for bricks is heavily dependent on residential construction. Almost 90% of bricks produced are used in residential construction, where their strength is relatively unimportant and their appeal is largely aesthetic. The market for new homes is sensitive to many factors, and brick sales are therefore usually unpredictable over the long term. In urban southern Ontario, bricks are the preferred exterior finish on housing. In other parts of Canada bricks are less frequently used, as they are more difficult to obtain, and more expensive than other alternative materials.

The demand for bricks has been increasing slightly in Ontario, although the use of alternative materials is also increasing. Of serious competition to the traditional clay brick is the concrete brick. Concrete brick producers are attempting to duplicate the appearance of clay bricks more cheaply. The appearance and quality of these bricks is steadily improving, and the demand for these bricks grow as they become more and more indistinguishable from clay bricks. Concrete bricks are 20 to 30% cheaper than clay bricks, and by 1982 they had captured almost 20% of the market.

The average selling price for bricks in Ontario is currently $300.00 per thousand bricks.

5.8.1.2 Compliance Costs

The facing table illustrates the costs for the Ontario domestic clay industry to comply with proposed changes to Regulation 308.

The total capital costs per plant to comply would be $1.5 million under scenario A and B, and $1.1 million per plant under scenario C. In addition, the annual operating cost per plant will be $0.2 million per plant under all three scenarios.

The net present value of these costs per plant for the domestic clay industry in Ontario is $1.3 million under scenario A and B, and $1 million under scenario C. The uniform annual costs per plant will be $0.2 million under scenario A and B, and $0.1 million under scenario C.

The uniform annual costs per tonne for the industry are $3.00 under scenario A and B, and $2.00 under scenario C.

The average selling price for bricks in Ontario is currently $300.00 per thousand bricks. Assuming that one brick weighs approximately 5 pounds, the selling price per tonne of bricks is approximately $132 per tonne. In this case, compliance costs would represent about 2.2% of the selling price under scenario A and B, and 1.7% of the price under scenario C.

The econometric models of Informetrica indicate that compliance costs to the non-metallic minerals industry in Ontario could represent up to 9.1% of the value added of the industry under scenarios A and B. The percentage of value added which compliance costs would represent to the non-metallic minerals industry in Ontario between 1989 and 2005 would be as follows under all three scenarios:

- o scenario A and B: 2.3% in 1989, to 9.1% in 1996, to 8.4% in 2005;
- o scenario C: 1.9% in 1989, to 7.8% in 1996, to 7.4% in 2005.

Those industries which have been grouped under the non-metallic mineral heading are: domestic and imported clay industries, cement, lime, and abrasives. Domestic Clay is only one component of the Informetrica non-metallic minerals grouping. Therefore, the above percentages may not accurately portray the impact of compliance costs on the value added of the domestic clay industry only.

5.8.1.3 Conclusions

Compliance costs represent around 2% of the selling price of bricks. Unfortunately, we have not been able to discover estimates of margins for the brick industry.

The brick industry, as other domestic clay industries, is facing competition from alternative materials, and any significant compliance costs may affect the competitiveness of the brick industry. Concrete bricks can be produced more cheaply, and have already captured approximately 20% of the market.

5.8.2 DRAINAGE TILE

The information source used for the drainage tile industry was the Ontario Ministry of Natural Resources publication "The Clay and Shale Industry in Ontario", published in 1987.

5.8.2.1 Overview of the Sector

Clay drainage tile is presently produced in 4 plants in Ontario, by a total of 3 companies. These companies are:

- o Amos C. Martin Ltd., which has 3 Ontario locations;
- o D.A. Janes & Son Ltd.; and
- o George Coultis & Sons Ltd..

The plant of George Coultis and Sons, has the annual capacity to produce 2 million tiles, although annual production had declined to 1 million in 1985. The 1987 industry review by the Ministry of Natural Resources indicated that the plant of D.A. Janes and Son has not produced drainage tiles since 1982, although it is capable of renewed production if the market improved. The Wallenstein plant of Amos C. Martin has an annual production of about 5 million tiles, while their Parkhill plant produces approximately 3.2 million tiles per year.

Ontario clay drainage tile production has been experiencing a major worldwide industry decline. Plastic drainage tubing, which is cheaper to produce and install, has been replacing clay drainage tile in many cases, although the durability of

plastic tubing relative to clay tile has not yet been proven. Worldwide decline in the consumption of clay drainage tile is a function of price. Western European countries are now nearing a complete conversion.

Many Ontario drainage tile plants have closed in recent years due to the declining market for clay drainage tiles. There were 3 plant closures in 1985, and 3 closures in 1982 as well. Peak production of drainage tiles in Ontario occurred in 1968, when a total of 30 plants produced 68 million tiles. In 1985, 5 Ontario plants produced about 10 million tiles. The number of active plants was reduced to 4 in 1986.

5.8.2.2 Compliance Costs

The table facing page 45 illustrates the costs for the Ontario domestic clay industry to comply with proposed changes to Regulation 308.

As for the brick industry, the total capital costs per plant to comply would be $1.5 million under scenario A and B, and $1.1 million per plant under scenario C. In addition, the annual operating cost per plant will be $0.2 million per plant under all three scenarios.

The net present value of these costs per plant for the domestic clay industry in Ontario is $1.3 million under scenario A and B, and $1 million under scenario C. The uniform annual costs per plant will be $0.2 million under scenario A and B, and $0.1 under scenario C.

The uniform annual costs per tonne for the industry are $3.00 under scenario A and B, and $2.00 under scenario C.

The econometric models of Informetrica indicate that compliance costs to the non-metallic minerals industry in Ontario could represent up to 9.1% of the value added of the industry under scenarios A and B (see page 46).

5.8.2.3 Conclusions

This industry sector is undergoing significant changes and pressures, and the estimated compliance costs for the industry are significant. The imposition of any additional costs not borne by competing products and foreign competitors could be expected to have significant adverse effects on the companies in this sector.

5.8.3 CLAY SEWER PIPE

5.8.3.1 Overview of the Sector

Clay companies in Ontario producing clay sewer pipes would also be affected by proposed regulations. According to the 1987 Ministry of Natural Resources industry review, there is only one company in Ontario now involved in this industry. While numerous other such plants once existed in Ontario, they have all been closed, and it is now only Canada Vitrified Products, a subsidiary of National Sewer Pipe Ltd., which produces clay sewage pipe in Ontario.

As in the drainage tile industry, the use of clay sewer pipes has declined dramatically with the advent of cheaper plastic pipes. The production of such pipe at Canada Vitrified Products is minor, and does not represent a substantial product line for the company due to weak sales. In 1987, less than 5% of the annual Ontario market for sewer pipe, which is estimated to be in the range of 2 million metres, is served by clay pipes.

5.8.3.2 Compliance Costs

The table facing page 45 illustrates the costs for the Ontario domestic clay industry to comply with proposed changes to Regulation 308.

As with the previous sectors of the domestic clay industry examined, the total capital costs per plant to comply would be $1.5 million under scenario A and B, and $1.1 million per plant under scenario C. In addition, the annual operating cost per plant will be $0.2 million per plant under all three scenarios.

The net present value of these costs per plant for the domestic clay industry in Ontario is $1.3 million under scenario A and B, and $1 million under scenario C. The uniform annual costs per plant will be $0.2 million under scenario A and B, and $0.1 million under scenario C.

The uniform annual costs per tonne for the industry are $3.00 under scenario A and B, and $2.00 under scenario C.

The econometric models of Informetrica indicate that compliance costs to the non-metallic minerals industry in Ontario could represent up to 9.1% of the value added of the industry under scenarios A and B (see page 46).

5.8.3.3 Conclusions

This industry has being experiencing a major decline in demand, due to intense competition from plastic pipes, which are cheaper. The additional costs of compliance with the proposed Regulation 308 would have significant adverse effects on the industry.

5.8.4 FLOOR AND WALL TILES

5.8.4.1 Overview of the Sector

Manufacturers of floor and wall tiles would also be affected by the proposed pollution regulations. In Ontario, there are two plants producing such tiles with domestic clay. There are several other producers of floor and wall tiles in Ontario, but these manufacture tiles using imported, rather than domestic, clay.

The world production of floor and wall tiles is in excess of 700 million metres square. Italy produces one third of these.

Ontario producers have traditionally faced strong competition from European manufacturers of tiles. France and Italy are leaders in technology for this industry. Technological development by these countries has focused on increased automation and computerized process control. This has improved production and

quality, while reducing costs. For Ontario's plants to be successful in this industry, new plants should implement foreign technology and management. The two domestic clay tile producers in Ontario are the most efficient. They are both relatively recent additions to the industry. Windsor Ceramic Tile Canada Ltd., was established in 1985, with a total capital investment of approximately $32 million. All their production equipment was supplied by a German firm, and the latest foreign technology was used in the construction of this plant. Great Lakes Ceramics is a new company which began production in 1986. They leased a plant which had been engineered in 1976 by a German firm as well.

Market demand for ceramic tile has been increasing steadily. Demand increased at an average annual rate of 7% between 1976 and 1980, and reached a level of 9.3 million metres square in 1981. Demand has since risen to 12 million metres square in 1985. A large percentage of the tile now produced in Ontario is exported to the U.S., which is recognized to be a growing market for ceramic tiles. Forty percent (40%) of the consumption of tiles in the U.S. is met by imports.

5.8.4.2 Compliance Costs

The table facing page 45 illustrates the costs for the Ontario domestic clay industry to comply with proposed changes to Regulation 308.

The total capital costs per plant to comply would be $1.5 million under scenario A and B, and $1.1 million per plant under scenario C. In addition, the annual operating cost per plant will be $0.2 million per plant under all three scenarios.

The net present value of these costs per plant for the domestic clay industry in Ontario is $1.3 million under scenario A and B, and $1 million under scenario C. The uniform annual costs per plant will be $0.2 million under scenario A and B, and $0.1 under scenario C.

The uniform annual costs per tonne for the industry are $3.00 under scenario A and B, and $2.00 under scenario C.

The econometric models of Informetrica indicate that compliance costs to the non-metallic minerals industry in Ontario could represent up to 9.1% of the value added of the industry under scenarios A and B (see page 46).

Those industries which have been grouped under the non-metallic mineral heading are: domestic and imported clay industries, cement, lime, and abrasives. Domestic Clay is only one component of the non-metallic minerals grouping. Therefore, the above percentages may not accurately portray the impact of compliance costs on the value added of the domestic clay industry only.

5.8.4.4 Conclusions

The floor and wall tiles industry faces strong competition from other producers worldwide. Competitiveness of the industry is an important factor as a significant proportion of shipments in the Ontario industry are exported. In particular, a significant proportion of the shipments of the Ontario tile industry are currently exported to the U.S., where the demand for floor and wall tiles is presently increasing at a rapid pace.

Because of the intense competition the Ontario industry faces internationally, estimated compliance costs may represent a burden to the industry.

5.8.5 CLAY FLOWERPOTS AND FILTER TILE

The following information on the clay flowerpots and filter tile industry has all been taken from the Ministry of Natural Resources publication "The Clay and Shale Industries of Ontario".

5.8.5.1 Overview of the Sector

Halton Ceramics is the only producer of clay flowerpots and filter tiles in Canada. Plastic flowerpots now dominate the market, although there are significant imports of clay pots from the U.S., Germany and Italy. Plants in clay pots sell better at the retail level because of their aesthetic appeal. Growers buy in volume and prefer the cheaper plastic pots, while consumers at the retail level prefer clay. The total Canadian market for plastic clay pots is about 4 times as large as that for clay pots.

Annual Canadian consumption of clay flowerpots is approximately 7 million, of which 20% is supplied by Halton Ceramics.

5.8.5.2 Compliance Costs

The table facing page 45 illustrates the costs for the Ontario domestic clay industry to comply with proposed changes to Regulation 308.

As with all domestic clay industries above, the total capital costs per plant to comply would be $1.5 million under scenario A and B, and $1.1 million per plant under scenario C. In addition, the annual operating cost per plant will be $0.2 million per plant under all three scenarios.

The net present value of these costs per plant for the domestic clay industry in Ontario is $1.3 million under scenario A and B, and $1 million under scenario C. The uniform annual costs per plant will be $0.2 under scenario A and B, and $0.1 million under scenario C.

The uniform annual costs per tonne for the industry are $3.00 under scenario A and B, and $2.00 under scenario C.

The econometric models of Informetrica indicate that compliance costs to the non-metallic minerals industry in Ontario could represent up to 9.1% of the value added of the industry under scenarios A and B (see page 46).

Those industries which have been grouped under the non-metallic mineral heading are: domestic and imported clay industries, cement, lime, and abrasives. Domestic Clay is only one component of the non-metallic minerals grouping. Therefore, the above percentages may not accurately portray the impact of compliance costs on the value added of the domestic clay industry only.

5.8.5.3 Conclusions

There is insufficient information available to assess the impacts of compliance costs on this one firm.

5.9 CEMENT

Sources contacted for information on the Ontario Cement industry include:

- o a consultant representing several companies;
- o the Canadian Portland Cement Association;
- o individual companies in the Ontario cement industry;
- o Ministry of Energy Mines and Resources cement industry official.

The Cement Industry Review, published as a component of the Energy Mines and Resources "Canadian Minerals Yearbook" was especially useful in obtaining a profile of the industry.

5.9.1 OVERVIEW OF THE SECTOR

The Ontario Cement industry involves 5 companies, and a total of 7 plants. Of these companies, 4 manufacture grey portland cement, while the fifth manufactures white cement. These companies are:

- o St Mary's Cement Limited, with 2 Ontario plants;
- o Lafarge Canada Inc., with 2 Ontario plants
- o Lake Ontario Cement Limited;
- o St. Lawrence Cement Inc.; and
- o Federal White Cement Limited.

The four grey portland cement companies are all large companies, comparable in size, while Federal White Cement Ltd. has smaller operations, with an annual capacity of up to 100,000 tonnes of white cement. The total annual capacity for the Ontario cement industry is close to 8 million tonnes.

The cement industry in Canada is presently 83% foreign-controlled. Companies in the cement industry are also typically verticallycompetition.

Federal White Cement has only one plant, which is thoroughly modern.

The demand for cement has risen steadily since 1984, as the value of both residential and non-residential construction has continued its upward trend. The future outlook for the Ontario cement industry is positive. According to the cement industry review of Energy, Mines and Resources, the Canadian Construction Association has predicted increases in non-residential construction through the 1986-95 period.

The July edition of the *Globe and Mail's* Report on Business Magazine contains 1987 revenue, profit and capital investment figures for several of Ontario's cement companies. The Report on Business profiles the Cement Industry as being one Canada's best industries in 1987, with a 15% increase over 1986 of average return on capital.

COMPLIANCE COSTS FOR THE CEMENT INDUSTRY

($ millions 1986)

COST TYPE \ SCENARIO	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	46.7	46.7	17.1
• per plant	5.8	5.8	2.1
Annual Operating Costs:			
• total sector	1.1	1.1	0.6
• per plant	0.1	0.1	0.08
Monitoring costs			
Capital cost:			
• total sector	5.6	5.6	5.6
• per plant	0.7	0.7	0.7
Annual Operating Costs:			
• total sector	2.5	2.5	2.0
• per plant	0.3	0.3	0.3
Total:			
Capital cost:			
• total sector	52.3	52.3	22.7
• per plant	6.5	6.5	2.8
Annual Operating Costs:			
• total sector	3.6	3.6	2.6
• per plant	0.4	0.4	0.3
Net Present Value per plant	3.2	3.2	2.0
Uniform Annual Cost per plant	0.4	0.4	0.3

Compliance Costs Per Tonne

($ 1986)

COST TYPE \ SCENARIO	A	B	C
Uniform Annual Costs per tonne	0.40	0.40	0.30
• as a % of value added of the non-metallic minerals industry	2.3 to 9.1%	2.3 to 9.1%	1.9 to 7.8%
• as a % of selling price (grey)	<1%	<1%	<1%
• as a % of selling price (white)	<1%	<1%	<1%

The 1987 figures contained in the Report on Business Magazine for Ontario's companies were as follows:

St. Lawrence Cement:

- profit: $73.6 million
- percentage increase in profits over 1986: 56%
- revenue: $697 million
- percentage increase in revenue over 1986: 16%
- capital expenditures: $29.3 million

Lafarge Canada Inc.:

- profit: $86.7 million
- percentage increase in profit over 1986: 43%
- revenue: $988.6 million
- percentage increase in revenue over 1986: 21%
- capital expenditures: $72.8 million

Lake Ontario Cement:

- revenues: $303.5 million
- profits, capital expenditures: not available

Report on Business Magazine, however, did not supply any figures for St. Mary's Cement Company.

The current selling price of a tonne of grey cement in Toronto is between $117 and $118 a tonne.

The current selling price of white cement (excluding transportation costs) is $251 a tonne.

5.9.2 COMPLIANCE COSTS

The emissions of the cement industry requiring controls are VOC, SO_2 and particulate matter. The control equipment required for the cement industry to meet emissions standards consists of electrostatic precipitators and baghouses.

The facing table demonstrates the capital, operating, and monitoring costs for the Ontario cement industry to comply with the proposed changes to Regulation 308.

The total capital cost per plant for both abatement and monitoring is approximately $6.5 million under scenario A and B, and $2.8 million under scenario C. The accompanying annual operating costs total $0.4 million under scenario A and B, and $0.3 million under scenario C.

The net present value of these costs per cement plant in Ontario is $3.2 million under scenario A and B, and $2 million per plant under scenario C. The uniform annual cost per cement plant would be $0.4 million per plant under scenario A and B, and $0.3 million under scenario C.

The uniform annual cost per tonne of cement produced in Ontario (using industry capacity) would be $0.40 under scenario A and B, and $0.30 under scenario C.

As the selling price for grey cement is currently between $108 and $109 dollars a tonne (when converted to 1986 dollars), this cost represents 0.4% of the selling price for grey cement under scenario A and B, and 0.2% of the selling price under scenario C.

The selling price for white cement is presently $232 a tonne (converted to 1986 dollars), and total compliance costs would represent between 0.2% and 0.1% of the selling price of white cement.

Several cement companies in Ontario operate two plants. The net present value of compliance costs for two cement plants would be approximately $6.4 million under scenario A and B, and $4 million under scenario C. Although the capital expenditures of cement companies vary greatly, typical average yearly capital expenditures may be $30 million. The net present value of compliance costs for two plants would therefore represent between 13% and 22% of typical yearly capital expenditures.

The econometric models of Informetrica indicate that compliance costs to the non-metallic minerals industry in Ontario could represent up to 9.1% of the value added of the industry under scenarios A and B. Cement is only one industry grouped under the heading non-metallic minerals; therefore, the following numbers may not accurately represent the impact compliance costs could have on the value added of the cement industry only.

The percentage of value added which compliance costs would represent to the non-metallic minerals industry in Ontario between 1989 and 2005 would be as follows under all three scenarios:

- o scenario A and B: 2.3% in 1989, to 9.1% in 1996, to 8.4% in 2005;
- o scenario C: 1.9% in 1989, to 7.8% in 1996, to 7.4% in 2005.

5.9.3. CONCLUSIONS

Compliance costs appear to represent a very small percentage of the selling price of cement. We have not been able to obtain information on cement profit margins, and can therefore not make any definite conclusions regarding the impact compliance costs will have on profitability.

Informetrica models indicate that the costs would consume about 9% of the value-added of the non-metallic minerals sector. This is certainly significant. Note that the cement industry represents approximately 14% of the total production of the entire grouping non-metallic minerals.

The grey cement industry is very price-competitive one, with Ontario producers exporting a significant amount to the U.S.. Compliance costs may potentially harm this large export market. Industry representatives have stated that cement companies in Ontario would consider shutting down all Ontario operations rather than comply with new regulations. Cement companies in Ontario have operations in the U.S. already.

The market for white cement is entirely different. Competition is not based on price but rather on quality. The white cement producer of Ontario may be able to pass on cost increases to customers to a greater extent than can the grey cement companies. Furthermore, compliance costs represent a far smaller proportion of the selling price of white cement.

5.10 LIME

Sources contacted for information on the Ontario Lime industry include:

- industry representatives from the federal Energy, Mines and Resources Ministry;
- the Canadian Chemical Producers Association;
- the Crop Protection Institute;
- the Canadian Fertilizer Institute;
- representatives from firms involved in the industry;
- Statistics Canada.

5.10.1 OVERVIEW OF THE SECTOR

The following information has been supplied to us by Michel Prud'homme of the Industrial Minerals Division of Energy Mines and Resources Canada:

"In Ontario, eight producers manufacture non-agricultural lime in Sault Ste. Marie, Amherstburg, Beachville, Guelph, Haley, Spragge, Ingersoll and Dundas.

In 1987, lime production reached 1,535,000 t, a slight decrease over 1986 due to a drop in production of iron and steel. Ontario accounts for two-thirds of Canada's total output.

Most of the lime produced is quicklime (97%) and hydrated lime sold to the merchant market. Half of the Quicklime produced is used captively for iron and steel, and chemicals. Quicklime sold to the merchant market is principally used for iron and steel, and chemicals while small tonnages are consumed by mining operations, pulp and paper mills, and waste water treatment works.

The current capacity of production for merchant lime is estimated at 1,590,000 tpa or 68% of total lime capacity of production including captive capacity. The rate of production is about 66%, a level which has been maintained for the last six years.

These figures do not take into account tonnages of lime recycled from the pulp and paper mills, where most of the lime reported for consumption is used as makeup."

According to figures supplied by Energy, Mines and Resources Canada, the 1987 lime production of 1,535,000 tonnes had a total value of $116,222,000 (1987 dollars) at a sale price of about of $76 (1987 dollars). Ontario accounts for over 65% of the total Canadian production. Canada exports about 11% of the lime produced, while imports account for about 3% of the total Canadian market.

Due to the competitive nature of the industry, representatives of the firms contacted were not willing to discuss the cost of producing lime. For this reason, it was also difficult to determine the market share of the firms in the industry, and

other relevant data. The percentage of total Ontario lime production capacity of each firm is as follows:

1. Beachvilime Ltd. - 40%

2. Steetley Industries Limited - 15%

3. General Chemical Canada Ltd. - 13%

4. The Algoma Steel Corporation Limited - 8%
   Reiss Lime Company of Canada Limited - 8%
   Stelco Inc. Chemical Lime Works - 8%

5. Guelph Dolime Ltd. - 5%

6. Timminco Ltd. Chromasco Division - 2%

This information was obtained from the list of Lime Producers in Canada, 1988, supplied by Michel Prud'homme of Energy, Mines and Resources Canada, Mineral Policy Sector.

Information from the *Globe and Mail* "Report on Business - Top 300 Private Companies" listed Steetley Industries Limited as having a total revenue of $222 million and assets of $110 million for the year 1987. Steetley is owned by Steetley PLG of the U.K..

The Non-Metallic Minerals Industry, Lime Industry SIC 3581 1986 Census Manufacturers for Ontario presented the following figures for the lime industry:

- total expenditures on wages for Ontario: $12,172,000
- total cost of fuel and electricity: $26,266,000
- total cost of materials and supplies: $16,278,000
- value of shipment of goods of own manufacture: $75,838,000
- value added: $33,327,000
- 5 firms in the industry

Industry representatives state that lime is a bulk material that is very sensitive to changes in transportation costs. The competition is regional due to the fact that the product does not lend itself to transport over great distances due to prohibitive costs. The industry in Northern Ontario is very competitive.

According to industry representatives, the excess capacity that exists in the industry has increased the level of competition in the industry.

A representative of an industry firm stated that the major area of technological innovation has been in fuel management. Fuel is a major cost component of lime production, as it is used in the operation of the kilns. There has been a good

COMPLIANCE COSTS

LIME

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	4.5	4.5	1.5
• per plant	0.5	0.5	0.2
Annual Operating Costs:			
• total sector	0.3	0.3	0.3
• per plant	0.03	0.03	0.03
Monitoring costs			
Capital cost:			
• total sector	3.0	3.0	3.0
• per plant	0.3	0.3	0.3
Annual Operating Costs:			
• total sector	1.2	1.2	0.9
• per plant	0.1	0.1	0.1
Total:			
Capital cost:			
• total sector	7.5	7.5	4.5
• per plant	0.8	0.8	0.5
Annual Operating Costs:			
• total sector	1.5	1.5	1.2
• per plant	0.2	0.2	0.1
Net Present Value per plant	0.9	0.9	0.7
Uniform Annual Cost per plant	0.1	0.1	0.09

Costs Per tonne

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Cost per tonne	0.40	0.40	0.30
• as a % of value added the non-metallic minerals	2.3 to 9.1%	2.3 to 9.1%	1.9 to 7.8%
• as a % of selling price	<1%	<1%	<1%

deal of success in the industry in reducing fuel consumption. Although there have been some changes in kiln design, none of these have been major variations.

The outlook for the industry is good. Lime is used in both the iron and steel industries and in the pulp and paper industry. Consumption of lime could improve if environmental concern led to an effort to reduce or eliminate acid rain causing emissions, especially those emissions resulting from coal-burning facilities.

5.10.2 COMPLIANCE COSTS

The facing table illustrates the cost for lime companies in Ontario to comply with proposed changes to Regulation 308.

The total capital cost for abatement and monitoring in 1986 dollars will be $0.8 million per plant under scenario A and B, and $0.5 million under scenario C. The accompanying annual operating costs are $0.2 million per plant under scenario A and B, and $0.1 million per plant under scenario C.

The net present value of these costs per lime plant is $0.9 million per plant under scenario A and B, and $0.7 million under scenario C. The uniform annual costs per plant will be $0.1 million under scenario A and B, and $0.09 million under scenario C.

The uniform annual cost per tonne of lime produced (calculated using industry capacity) is $0.40 under scenario A and B, and $0.30 under scenario C.

The price per tonne given to us by Energy, Mines and Resources Canada is $70.31(in 1986 dollars) per tonne. The compliance cost per tonne therefore represents between 0.4% and 0.5% of the selling price per tonne.

The econometric models of Informetrica indicate that compliance costs to the non-metallic minerals industry in Ontario could represent up to 9.1% of the value added of the industry under scenarios A and B. The percentage of value added which compliance costs would represent to the non-metallic minerals industry in Ontario between 1989 and 2005 would be as follows under all three scenarios:

- scenario A and B: 2.3% in 1989, to 9.1% in 1996, to 8.4% in 2005;
- scenario C: 1.9% in 1989, to 7.8% in 1996, to 7.4% in 2005.

Those industries which have been grouped under the non-metallic mineral heading are: domestic and imported clay industries, cement, lime, and abrasives. However, as the lime industry is only one component of the non-metallic minerals industry, these percentages may not accurately reflect the impact of compliance costs on the value added of the industry.

5.10.3 CONCLUSIONS

Compliance costs represent less than 1% of the selling price for lime, but about 9% of the value added of the industry, according to the Informetrica results. We have

not been able to obtain information on profit margins for this industry. The preliminary conclusion is that compliance costs could be significant for this competitive industry.

5.11 PETROLEUM REFINERIES

Sources of information on the petroleum refining industry include:

- the Federal Department of Regional Industrial Expansion;
- the Petroleum Monitoring Agency; in particular their 1987 monitoring report for the Canadian Petroleum industry.
- Energy, Mines and Resources;
- the Oil and Gas division of the Ontario Ministry of Energy;
- the MISA industry profile;
- Statistics Canada Catalog number 45-004.

5.11.1 OVERVIEW OF THE SECTOR

There are seven petroleum refineries in Ontario, which are owned by 6 firms. These 6 firms are as follows:

- Petrosar: 1 Ontario refinery capacity of 27,820 m^3/day
- Petro-Canada: 2 Ontario refineries; capacity of 22,340 m^3/day.
- Esso Petroleum: 1 Ontario refinery capacity of 19,600 m^3/day
- Texaco Canada: 1 Ontario refinery capacity of 15,100 m^3/day
- Suncor Inc.: 1 Ontario refinery capacity of 14,300 m^3/day
- Shell Canada: 1 Ontario refinery capacity of 11,290 m^3/day

total capacity: 110,450 m^3/day

In 1985, these Ontario refineries represented about 35% of the refinery production capacity in Canada. These companies are mainly vertically integrated and operate at all levels of the petroleum industry.

As of 1984, 4 firms controlled 75% of refinery capacity in Ontario. According to the MISA profile, the petroleum refining industry is regarded by many authorities as a regional oligopoly. There are few enough sellers in the relevant market that individual producers must take into account the actions of other firms in making business decisions. Companies in such a market may be better able to pass on cost increases to consumers through prices, unless of course they are all required to raise prices to such an extent that they can be undercut by refiners from other regions.

According to the MISA profile, approximately 87% of Ontario refinery production was consumed in Ontario in 1985, while the remainder was exported to the U.S.. Energy Mines and Resources representatives confirmed this, stating that typically 85-90% of refinery production in Ontario is consumed in Ontario, and that presently all our exports are to the U.S..

Statistics Canada (catalog number 45-004) provides the following information on imports and exports of refinery production in Ontario during 1987:

Total refinery production:	30,004,880 cubic metres
imports:	1,205,968 cubic metres
exports:	3,311,174 cubic metres
interprovincial-in:	4,162,839 cubic metres
interprovincial-out:	2,301,437 cubic metres
domestic sales:	27,018,757 cubic metres

Ontario refineries therefore exported a total of 11% of their total production. Interprovincial-in represented 15.4% of domestic refinery sales in Ontario in 1987, while imports represented 4.5% of domestic sales.

According to a representative of Energy Mines and Resources, interprovincial transfers of refinery products to date this year have been mainly from Quebec. There is a significant amount of trade between Quebec and Ontario in the refining industry. There is very little transfer between Ontario and the Western and Prairie provinces.

Capacity utilization information has been obtained for refineries in all Canadian regions from Energy, Mines and Resources. Capacity utilization for refineries for the first quarter of 1988; and the average utilization for the past year (from March 1987 to March 1988) are as follows:

Region	1st Quarter 1988	From March '87 to March '88
Atlantic Region	82%	74%
Quebec	91%	86%
Ontario	79%	77%
Prairies	88%	87%
British Columbia	86%	89%

Utilization rates are somewhat seasonal. The second and third quarters (the summer months) tend to be the most active months for refineries.

The product breakdown of refinery production in Ontario is as follows:

- transportation fuels (gasoline, diesel, aviation): 50% of production;
- heating fuels: 20% of production;
- petrochemical feedstocks: 11% of production.

There is no great degree of specialization in the Ontario refining industry.

According to the industry profile prepared for MISA, the number of petroleum refineries in Canada has decreased in light of declining demand for oil products. Since 1983, four refineries in Ontario have closed, while 12 refineries in Canada have closed within the same time period.

Petroleum specialists at the Federal Department of Energy, Mines and Resources have estimated that demand for gasoline is relatively inelastic in the short run, although over the long run it is less so as consumers have opportunities to reduce consumption or change their lifestyles accordingly.

World oil prices have been dropping since late 1985. For example, the MISA profile shows that the price of crude oil declined by 54% between December 1985 and July 1986. Gasoline prices also dropped, though not by the same amount as crude oil prices. Lower crude oil prices would therefore likely increase the profit margins of refineries. The MISA profile demonstrates that in January 1986, the retail price of gasoline was 50.7 cents. Of this amount, 6 cents, or 11.8% went to the refiner, while the remainder went to taxes, royalties, the dealer, etc.. However, in April 1986, the retail price for gasoline was 36.2 cents per litre, and the refiner received 23.6% of that amount, or 9 cents.

These profit margins decreased considerably in 1987. During 1987, the difference between average refined product price and average refiner acquisition costs of crude oil ranged from 8.2 cents to 11 cents a litre. These margins are much lower than those of 1986. This decrease is partly due to a gross margin slide of nearly 0.3 cents per litre which occurred, according to the annual report of the Petroleum Monitoring Agency.

Profit Margins (average for all products) per litre, for the refining and marketing segment of the petroleum industry in 1987 were as follows:

Gross sales margin =		$0.2863
less:	federal sales and excise taxes; cost of goods sold; and distribution, selling and administrative expenses =	$0.0213
less:	interest expenses and current taxes =	$0.0157

Therefore, net profit margins per litre of product sold in the refining and marketing segment was 1.57 cents in 1987.

Return on capital employed for the refining and marketing segment of the petroleum industry in Canada declined to 6.5% in 1987, from 6.9% in 1986. Capital employed here refers to the net book value of total assets, less current liabilities.

The financial performance of the entire petroleum industry in Canada improved dramatically in 1987, as net income from operations amounted to $3.4 billion as compared to a loss of $2.7 billion in 1986. The weak financial performance of 1986 was largely attributable to the collapse in international oil prices and the subsequent writedown of over $3 billion in book value of oil and gas properties in Canada and internationally.

The total revenue of refining and marketing in the Canadian Petroleum industry amounted to $24.2 billion in 1987, and the cash income after current taxes for the refining and marketing sector was $1.3 billion.

Financial information on firms with petroleum refineries in Ontario was obtained from the July edition of the *Globe and Mail* Report on Business. Information available on each company is as follows:

1. Imperial Oil:

   - 1987 profits of $745 million, a 161% increase over 1986;
   - 1987 operating revenues of $7.6 billion, a 29% increase over 1986;
   - 1985 capital expenditures (from profile) of $1.1 billion.

2. Shell Canada:

   - 1987 profits of $350 million, a 127% increase over 1986;
   - 1987 operating revenues of $4.8 billion, a 0% change from 1986;
   - 1985 capital expenditures of $469 million.

3. Texaco Canada:

   - 1987 profits of $320 million, a 13% increase from 1986;
   - 1987 operating revenues of $2.8 billion, a 2% increase over 1986.;
   - 1985 capital expenditures of $762 million.

4. Petro-Canada:

   - 1987 profits of $213 million, a 17% increase over 1986;
   - 1987 operating revenue of almost $5 billion, a 2% decrease over 1986;
   - 1985 capital expenditures of $711 million.

5. Suncor:

   - 1987 profit of $48 million;
   - 1987 operating revenue of $1.4 billion, a 14% increase over 1986;
   - 1985 capital expenditures of $317 million.

6. Polysar (company owning Petrosar):

   - 1987 profit of $228 million;
   - 1987 operating revenue of $2.9 billion, a 9% increase over 1986.

According to the Ontario Ministry of Energy and Energy Mines and Resources, refining costs in Ontario are higher than costs of refining in Edmonton and the U.S. The difference in costs is mainly attributable to relative age and scale of plants operating in each region. Edmonton refineries are the newest and most modern in Canada. Canadian refineries have slightly higher refining costs than those in the U.S., although the difference is only significant when Canadian refineries are compared to the extremely large refineries of the Gulf Coast.

COMPLIANCE COSTS

PETROLEUM REFINING

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	237.4	237.4	156.3
• per plant	33.9	33.9	22.3
Annual Operating Costs:			
• total sector	37.4	50.0	15.9
• per plant	5.3	7.1	2.3
Monitoring costs			
Capital cost:			
• total sector	11.4	11.4	11.4
• per plant	1.6	1.6	1.6
Annual Operating Costs:			
• total sector	4.3	4.3	2.3
• per plant	0.6	0.6	0.3
Total:			
Capital cost:			
• total sector	248.8	248.8	167.7
• per plant	35.5	35.5	23.9
Annual Operating Costs:			
• total sector	41.7	54.3	18.2
• per plant	5.9	7.7	2.6
Net Present Value per plant	33.1	41.0	16.0
Uniform Annual Costs per plant	4.5	5.6	2.2

Costs Per tonne

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Costs per tonne	1.10	1.30	0.50
• as a % of value added	8.5 to 52.4%	9.9 to 63.5%	4.6 to 26.6%
• as a % of profit	7.3%	8.7%	3.3%

5.11.2 COMPLIANCE COSTS

The facing table illustrates the costs for Ontario's Petroleum refineries to comply with the proposed changes to Regulation 308.

The total capital cost to each refinery for abatement and monitoring is $35.5 million under scenario A and B, and $23.9 million under scenario C. The accompanying annual operating costs are $5.9 million per refinery under scenario A, $7.7 million per refinery under scenario B, and $2.6 million per refinery under scenario C.

The net present value of these costs per refinery is $33.1 million under scenario A, $41 million under scenario B, and $16 million under scenario C. The uniform annual cost per refinery will be $4.5 million under scenario A, $5.6 million under scenario B, and $2.2 million under scenario C.

The uniform annual costs per tonne are about $1.10 per tonne under scenario A, $1.30 under scenario B, and $0.50 under scenario C.

Net profit margins for the refining and marketing segment of the Canadian petroleum industry were 1.50 cents (converting to 1986 dollars) per litre in 1987, which translates to about $15.00 per tonne. Compliance costs therefore represent 7.3% of profit margins under scenarios A, 8.7% under scenario B, and 3.3% of profit margins under scenario C.

The econometric models of Informetrica indicate that compliance costs to the petroleum refining industry in Ontario could represent up to 63.5% of the value added of the industry under scenario B. This percentage of value added was calculated by dividing operating expenses incurred to comply by the value added of petroleum refineries in Ontario. Analysis of the petroleum refining industry by Informetrica also shows that compliance costs represent a significant burden to the industry. However, the magnitude of the impact shown by Informetrica's model is much higher than the impact our information indicates.

The percentage of value added which compliance costs would represent to the petroleum refining industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- scenario A: 8.5% in 1989 to 52.4% in 2005;
- scenario B: 9.9% in 1989 to 63.5% in 2005; and
- scenario C: 4.6% in 1989 to 26.6% in 2005.

5.11.3 CONCLUSIONS

The information on the structure of the sector in Ontario and the above analysis of compliance costs show clearly that the current proposals for air pollution abatement would have serious consequences for this industry.

5.12 ASPHALT PLANTS

The asphalt plants which will be affected by the proposed changes to Regulation 308 will be only those portable asphalt plants not yet equipped with baghouses. Asphalt plants already equipped with baghouses meet all scenarios of proposed emission controls. Only the plants equipped with Venturi systems would be unable to meet the proposed regulation of particulate emission.

Information on the portable asphalt plant industry was obtained through interviewing a representative of one of the firms involved in the industry.

5.12.1 OVERVIEW OF THE SECTOR

There are 20 portable asphalt plants in Ontario which are not yet equipped with baghouses, and which would be affected by proposed regulations. While these plants are portable, in practice they tend to stay within one province. A plant may operate anywhere in Ontario depending on the demand for asphalt.

A portable asphalt plant costs approximately $1 million including a baghouse. It is believed that the presence of a baghouse on the plant does not affect the profitability of the plant. However, industry representatives stated that to retrofit a Venturi plant to include a baghouse represented a major expense for a portable plant.

There are no set prices for asphalt in Ontario but an average price for laying 50,000 tonnes of medium quality (HL3) with Asphalt Cement (the liquid asphalt that is used to make pavement) included would cost about $40/tonne if it was laid in Southern Ontario in September. This price is subject to variation, depending on the amount of asphalt laid, the season, the quality of the asphalt and the time frame of the job. A similar job to the one described above might cost as much as $70/tonne in Moosonee.

Industry representatives stated that there is generally about a 10-15% profit margin that fluctuates relative to demand. The industry is very competitive with member firms bidding on the various jobs available across the province. The industry is currently busy but the activity will taper. Generally the amount of industry activity is directly related to the economic conditions prevailing at the time. The amount of annual capital expenditures is also directly related to the overall economy and no figures are available.

According to an industry representative, the Ontario Ministry of Transport (MTO) has produced a report which projects the total provincial (including municipal) expenditures on asphalt paving to be $927 million for 1988/89. At a profit margin of 10% this projects to total profit for the industry of $92.7 million.

COMPLIANCE COSTS

ASPHALT PAVING

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	7.4	7.4	5.4
• per plant	0.4	0.4	0.3
Annual Operating Costs:			
• total sector	-0.2	-0.2	0.3
• per plant	-0.01	-0.01	0.02
Monitoring costs			
Capital cost:			
• total sector	8.2	8.2	8.2
• per plant	0.4	0.4	0.4
Annual Operating Costs:			
• total sector	3.2	3.2	2.6
• per plant	0.2	0.2	0.1
Total:			
Capital cost:			
• total sector	15.6	15.6	13.6
• per plant	0.8	0.8	0.7
Annual Operating Costs:			
• total sector	3.0	3.0	2.9
• per plant	0.2	0.2	0.1
Net Present Value per plant	0.8	0.8	0.8
Uniform Annual Cost per plant	0.1	0.1	0.1

Compliance Costs Per tonne

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual cost per tonne	0.18	0.18	0.17
• as a % of value added	1% to 6.7%	1% to 6.7%	1% to 6.3%
• as a % of selling price	<1%	<1%	<1%
• as a % of profit	3.9%	3.9%	3.7%

5.12.2 COMPLIANCE COSTS

The facing table illustrates the costs for the asphalt industry of Ontario to comply with proposed regulations.

The total capital cost for each portable asphalt plant will be $0.8 million under scenarios A and B, and $0.7 million under scenario C. The accompanying annual operating costs will be approximately $0.2 million per plant under scenarios A and B, and $0.1 million under scenario C.

The net present value of these costs per portable asphalt plant is $0.8 million under all three scenarios. The uniform annual cost per plant will be $0.1 million under all three scenarios.

The uniform annual cost per tonne of asphalt produced by the industry is approximately $0.18 under scenario A and B, and $0.17 per tonne under scenario C.

As noted above, industry representatives have stated that the price for laying asphalt varies according to season, amount of asphalt laid, etc.. However, for the purposes of this analysis we will use a typical price for laying asphalt in Southern Ontario, which is $37 (in 1986 dollars) a tonne. The compliance cost per tonne calculated above represents about 0.5% of this selling price. Industry representatives have also informed us that they receive profit margins of between 10-15%. A 12.5% profit margin on a tonne of asphalt laid for $37 a tonne would amount to $4.63. The compliance cost would then equal between 3.7% and 3.9% of the profit margin.

The econometric models of Informetrica indicate that compliance costs to the asphalt industry in Ontario could represent up to 6.7% of the value added of the industry under scenario A and B. The percentage of value added compliance costs would represent to the asphalt industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- scenario A and B: 1% in 1989 to 6.7% in 2005;
- scenario C: 1% in 1989 to 6.3% in 2005.

These costs would be borne only by a part of the sector, i.e., those portable plants which do not currently have a baghouse for their emissions. The value added percentages of Informetrica are likely underestimated due to the fact that the model has made calculations using the entire asphalt industry in Ontario, while it is only a small sub-sector which will be affected. However, both analyses indicate that compliance costs will have a significant impact on the industry.

5.12.3 CONCLUSIONS

If the regulations were to be applied to existing portable asphalt paving plant, the total costs would amount to nearly 4% of the reported profit margin for that part of the sector that would have to come into compliance with the regulations. The affected part of the sector would thus be placed at a significant competitive disadvantage, while it brought its equipment up to the standard of the rest of the sector.

The econometric models of Informetrica indicate also that compliance costs may have a significant impact upon this industry, representing up to 6.7% of value added.

5.13 ORGANIC CHEMICALS

Sources contacted for information on the organic chemicals industry include:

- o the MISA industry profile;
- o an industry profile published by the federal Department of Regional Industrial Expansion (DRIE); and
- o industry representatives at DRIE.

5.13.1 OVERVIEW OF THE SECTOR

The Organic Chemicals sector comprises 37 companies in Ontario. The organic chemical sector consists of firms involved in the manufacture and/or processing of petrochemicals, organic and specialty chemicals, and finished products. Most organic chemical products produced in Ontario are derived from natural gas and oil.

The petrochemical industry is currently one of the fastest growing industries in Canada. Demand for organic chemicals is growing, and sales of petrochemical products is increasing an average of 10% annually. The international drop in oil prices has resulted in increased consumption of petrochemicals worldwide. Producers are currently seeking to expand capacity to meet this growing demand. The Canadian petrochemical industry suffered severe losses between 1982 and 1986, but is now operating at close to full capacity. Between 1982 and 1986, the petrochemical industry had a total after tax loss of about $1.1 billion Statistics for 1987 are not yet available.

According to the DRIE industry profile, the profitability of the Canadian petrochemical industry will likely increase as product prices worldwide rise to levels which will justify the construction of increased capacity which will soon be needed worldwide.

The petrochemical industry in Ontario consists of both large and small companies. According to the MISA profile, a relatively small number of large companies represent the bulk of production in Ontario, with a large number of much smaller firms representing the remainder. These larger firms, such as Polysar and Dow, are often vertically integrated companies which have captive petrochemical plants. There is a reasonably high level of interdependence among the petrochemical companies of Ontario. The output of one small plant is often the input of another.

The petrochemical industry in Canada represents more than 60% of the chemical manufacturing industry in Canada. Companies involved in the petrochemical industry are mainly large multinationals which are mostly foreign controlled. Polysar and Novacor are large Canadian owned companies involved in the sector.

The Canadian organic chemical industry is a net exporter of petrochemicals, and a net importer of organic and specialty chemicals. Approximately 40% of the output of the Canadian petrochemical industry is exported. Over 60% of these exports are

to the U.S.. In terms of world supply, Canadian companies are a small but growing component.

Tariffs are a significant factor in the Canadian petrochemical industry. Canadian producers would gain from tariff reduction or removal under the Free Trade Agreement. The Free Trade Agreement would provide for tariffs on most petrochemicals to be phased out over a five year period.

The industry profile prepared by DRIE states that one strength of the Petrochemical industry in Ontario is that the majority of its plants world class in scale and in technology. However, producers in Canada tend to have higher capital costs (between 5% and 15% higher) than their major competition, which is located on the U.S. Gulf coast. Research and Development expenditures by the petrochemical industry in Ontario represent about 1.1% of sales. Much of the research and development activity in this industry involves transferring technology, and the development of new applications and products. Funding for research and development is mainly internally generated by the industry, as federal government funding to the chemical products sector represents approximately 2.6% of research and development expenditures.

According to the MISA profile, Ontario's organic chemical companies tend to be price takers. Market prices for petrochemicals are set in international markets. Prices are heavily influenced by American producers on the Gulf of Mexico Coast. These U.S. producers enjoy a price setting position due to the numerous advantages they have over other competitors worldwide. According to the profile, these advantages include:

- lower construction and labour costs;
- vertically integrated companies;
- flexibility in the supply of feedstocks ;
- economies of scale;
- lower operating costs; and
- skilled labour force.

The future outlook for the petrochemical industry is positive. Feedstock prices are expected to grow, but at a much slower rate than the price level increases experienced during the 1970's. Crude oil prices are expected to remain under $20 a barrel U.S. until 1994, and Natural GAs is expected to increase from $2 per thousand cubic feet (MCF) to $4/MCF by the year 2000. (taken from the MISA profile, whose source was the Globe and Mail, 88/04/14&18)
These prices are dependent on OPEC pricing strategies.

According to the industry profile prepared by DRIE, increase in worldwide petrochemical capacity will be required by the early 1990's. This increase in capacity is expected to be located in established industrialized countries. DRIE expects that lesser and newly industrialized countries will play only a minor role, and that any capacity increase in these countries will essentially be to satisfy their domestic requirements.

Exchange rate fluctuations can have a significant impact upon the profitability of the petrochemical industry in Ontario. According to the MISA profile, Canadian

plants will also likely continue to enjoy a production cost advantage as the Canadian dollar remains weak relative to the U.S. dollar.

If the Free Trade Agreement becomes reality, Canada's organic chemical sector will face increased competition as well as greater access to U.S. markets. Free Trade may result in the closure of unprofitable plants.

Financial information is only available for a few companies, from the July edition of the Globe and Mail Report on Business Magazine. These companies are:

Dupont Canada Inc., which has 3 organic chemical plants in Ontario:

- 1987 profit of $90.6 million; a 50% increase over 1986;
- 1987 operating revenues of $1.3 billion; an 8% increase over 1986;
- 1987 capital expenditures of $63 million, a 33% decrease from 1986.

Celanese Canada Inc., which has 1 organic chemical plant in Ontario:

- 1987 profits of $28.4 million; a 51% increase over 1986;
- 1987 operating revenues of $351 million; a 2% increase form 1986;
- 1987 capital expenditures of $21 million; a 67% increase from 1986.

Dow Chemical Canada, which has 1 organic chemical plant in Ontario:

- 1987 profits unavailable;
- 1987 operating revenue of $1.6 billion; a 15% increase over 1986;
- 1987 capital expenditures of $77 million; a 21% decrease from 1986.

Polysar Energy and Chemical, which has 1 organic chemical plant in Ontario:

- 1987 profits of $228 million;
- 1987 revenues of $2.9 billion; a 9% increase over 1986.

Rohm and Haas Canada Inc., with 1 organic chemical plant in Ontario:

- 1987 profits of $11.5 million;
- 1987 revenue of $130.5 million.

Uniroyal Goodrich Canada:

- 1986 profits of $3.3 million;
- 1986 revenues of $154 million.

CIL, with 2 organic chemical plants in Ontario:

- 1987 profits of $40 million; a 100% increase from 1986;
- 1987 operating revenues of $1.3 billion; a 4% increase from 1986;
- 1987 capital expenditures of $50 million; a 2% decrease from 1986.

COMPLIANCE COSTS

ORGANIC CHEMICALS

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	840.0	840.0	588.0
• per plant	22.7	22.7	15.9
Annual Operating Costs:			
• total sector	42.0	42.0	16.8
• per plant	1.1	1.1	0.5
Monitoring costs			
Capital cost:			
• total sector	9.4	9.4	9.4
• per plant	0.25	0.25	0.25
Annual Operating Costs:			
• total sector	12.3	12.3	6.0
• per plant	0.3	0.3	0.16
Total:			
Capital cost:	849.4	849.4	597.4
• total sector	23.0	23.0	16.1
• per plant			
Annual Operating Costs:	54.3	54.3	22.8
• total sector	1.5	1.5	0.6
• per plant			
Net Present Value per plant	10.8	10.8	5.8
Uniform Annual Cost per plant	1.5	1.5	0.8

Costs Per tonne*

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Cost per tonne	62.00	62.00	33.00
• as a % of value added of petrochemical manufacturing	2.4 to 9.5%	2.4 to 9.6%	1.5 to 5.7%

Union Carbide Canada, which has one Ontario organic chemical plant:

- 1987 profits of $26 million, a 57% increase from 1986;
- 1987 operating revenues of $421 million; a 17% increase from 1986;
- 1987 capital expenditures of $34.6 million, a 16% decrease from 1986.

5.13.2 COMPLIANCE COSTS

The facing table illustrates the compliance costs for the organic chemicals industry in Ontario to comply with regulation 308.

The total capital cost per plant for this industry will be nearly $23 million under scenario A and B, and $16.1 million per plant under scenario C. The accompanying annual operating costs are $1.5 million per plant under scenario A and B, and $0.6 million under scenario C.

The net present value of these costs per organic chemical plant is $10.8 million under scenario A and B, and $5.8 million under scenario C. The uniform annual cost per plant will be about $1.5 million under scenario A and B, and $0.8 million under scenario C.

The uniform annual cost per tonne produced by the industry (calculated using industry capacity) will be approximately $62 per tonne under scenario A and B, and $33 per tonne under scenario C.

The econometric models of Informetrica indicate that compliance costs to the petrochemicals manufacturing industry in Ontario could represent up to 9.6% of the value added of the industry under scenario B. Grouped under the petrochemicals manufacturing heading are the organic chemical industry, plastics and synthetic resins, paint and varnish, printing ink, and other chemicals. The model of Informetrica indicates that compliance costs will have a significant impact on the value added of the petrochemicals industry. However, organic chemicals is only one component of the petrochemicals industry as grouped by Informetrica.

The percentage of value added which compliance costs would represent to the petrochemical manufacturing industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- scenario A: 2.4% in 1989, to 9.5% in 1993, to 6.7% in 2005;
- scenario B: 2.4% in 1989, to 9.6% in 1993, to 6.8% in 2005;
- scenario C: 1.5% in 1989, to 5.7% in 1993, to 3.9% in 2005.

5.13.3 CONCLUSIONS

There is such a variety of products involved in the Organic chemical industry that it is difficult to make any conclusions regarding the impact of compliance costs on the profitability of the industry.

The results of Informetrica indicate that compliance costs will represent a significant burden on the entire petrochemicals manufacturing industry, of which organic chemicals is a large component.

5.14 PRINTING INK

The sector of this industry that would be affected by the proposed regulations is that of printing ink manufacturing. Emissions which would require stricter controls are particulate matter and VOC.

Information on this sector of the industry was obtained from interviews with industry representatives, representatives of member firms, Statistics Canada and a member of the printing industry.

5.14.1 OVERVIEW OF THE SECTOR

There are 40 printing ink manufacturing plants in Ontario. Printing Ink plants in Ontario represent approximately 80-90% of the Canadian market. The firms are principally American-owned branch plants with 2 of the firms being Canadian-owned - Canadian Fine Color Company and CSC Liquid Inc.

The industry is very competitive with the competition being generated internally in Ontario. Due to import duties most of the product marketed in Canada is made here. There are some exports but these are generally in the specialty product lines. The industry representative was not able to provide information on the quantities or destinations of exported products.

The industry is technologically innovative according to industry representatives. Information from Statistics Canada for SIC 3791 from the 1985 Census of Manufacturing for the Printing Ink Industry presented the following figures for Ontario printing ink manufacturing:

- total expenditures on wages for the industry: $16,464,000
- total expenditures on fuel and electricity: $2,184,000
- total expenditures on materials and supplies: $103,916,000
- total value of shipments of goods: $174,674,000
- total value added: $68,488,000

A representative of the printing industry informed us that an average price for a standard ink was $10 per kilo. This figure was obtained from a member of the printing industry as the manufacturers association is only allowed to issue industry figures to members. However, the industry representatives declined to give any information on profit margins or production costs, due to the competitive nature of the industry.

Industry representatives have stated that the success of this industry is dependent on activity in the printing industry. The industry position is that if free trade is

COMPLIANCE COSTS

PRINTING INK

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	16.7	25.1	10.4
• per plant	0.4	0.6	0.3
Annual Operating Costs:			
• total sector	-0.6	-0.6	0.2
• per plant	-0.02	-0.02	0.005
Monitoring costs			
Capital cost:			
• total sector	2.2	2.2	2.2
• per plant	0.06	0.06	0.005
Annual Operating Costs:			
• total sector	1.0	1.8	1.0
• per plant	0.03	0.05	0.03
Total:			
Capital cost:			
• total sector	18.9	27.3	12.6
• per plant	0.5	0.7	0.3
Annual Operating Costs:			
• total sector	0.4	1.2	1.2
• per plant	0.01	0.03	0.03
Net Present Value per plant	0.1	0.3	0.2
Uniform Annual Cost per plant	0.02	0.04	0.03

Costs Per tonne

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Cost per tonne	11.00	22.00	16.00
• as a % of value added of petrochemicals manufacturing	2.4 to 9.5%	2.4 to 9.6%	1.5 to 5.7%
• as a % of selling price	1.2%	2.4%	1.7%

implemented industry representatives predict slowdown for the printing industry. The industry is also affected by petroleum prices because the pigments, resins (used as a pigment carrier) and the solvents used in the manufacturing are all obtained from the refining of crude oil. There are a few non-petroleum components in some inks (pigment, lead, mercury, cadmium, cobalt, chromium, nickel), but the price of these commodities affects the price of specific inks more than the industry as a whole.

Industry representatives hold the position that there is the possibility that the high level of foreign ownership may affect future profitability and competitiveness.

5.14.2 COMPLIANCE COSTS

The facing table illustrates the costs for the Ontario printing ink manufacturing industry to comply with proposed regulations.

The total abatement and monitoring capital costs for compliance would be $0.5 million per plant under scenario A, $0.7 million under scenario B, and $0.3 million per plant under scenario C. The accompanying annual operating costs per plant will be $0.01 million under scenario A, $0.03 million under scenario B and C.

The net present value of these costs per plant is $0.1 million under scenario A, $0.3 million under scenario B, and $0.2 million under scenario C. The uniform annual costs per plant will be $0.02 million under scenario A, $0.04 million per plant under scenario B, and $0.03 million per plant under scenario C.

The uniform annual cost per tonne (calculated at industry capacity) is approximately $11 under scenario A, $22 under scenario B, and $16 per tonne under scenario C.

The average price per tonne which we have been given by an industry representative is $925 (in 1986 dollars). The compliance costs would therefore represent between approximately 1.2% and 2.4% of the selling price per tonne.

The econometric models of Informetrica indicate that compliance costs to the petrochemicals manufacturing industry in Ontario could represent up to 9.6% of the value added of the industry under scenario B. Grouped under the petrochemicals manufacturing heading are the organic chemical industry, plastics and synthetic resins, paint and varnish, printing ink, and other chemicals.

The percentage of value added which compliance costs would represent to the petrochemical manufacturing industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- scenario A: 2.4% in 1989, to 9.5% in 1993, to 6.7% in 2005;
- scenario B: 2.4% in 1989, to 9.6% in 1993, to 6.8% in 2005;
- scenario C: 1.5% in 1989, to 5.7% in 1993, to 3.9% in 2005.

However, printing ink is only one component of the petrochemicals manufacturing industry, and these numbers may not accurately reflect the impact of compliance costs on the value added of printing ink manufacturing only.

COMPLIANCE COSTS

OTHER CHEMICAL PRODUCTS

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	71.0	71.0	60.0
• per plant	0.4	0.4	0.3
Annual Operating Costs:			
• total sector	2.0	2.0	1.0
• per plant	0.01	0.01	0.005
Monitoring costs			
Capital cost:			
• total sector	38.5	38.5	38.5
• per plant	0.2	0.2	0.2
Annual Operating Costs:			
• total sector	50.5	50.5	24.4
• per plant	0.3	0.3	0.1
Total:			
Capital cost:			
• total sector	109.5	109.5	98.5
• per plant	0.6	0.6	0.5
Annual Operating Costs:			
• total sector	52.5	52.5	25.4
• per plant	0.3	0.3	0.1
Net Present Value per plant	1.3	1.3	0.7
Uniform Annual Cost per plant	0.2	0.2	0.1

Costs Per tonne

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Costs	82.00	82.00	42.00
• as a % of value added of petrochemical manufacturing	2.4 to 9.5%	2.4 to 9.6%	1.5 to 5.7%

5.14.3 CONCLUSIONS

Compliance costs represent between 1 and 2% of the selling price of printing ink. We have not been able to obtain information on profit margins for the industry, and so cannot assess the potential significance, if any, of this increase in costs

Competition in the printing ink industry is mainly within Ontario and very little is exported. If all printing ink companies in Ontario are faced with the same costs, they may be able to pass on costs to customers.

5.15 OTHER CHEMICAL PRODUCTS

5.15.1 OVERVIEW OF THE SECTOR

Other chemical products industry in Ontario comprises 188 companies. These companies are engaged in the production of a wide variety of products, as can be seen by the attached definition of the SIC.

These companies will vary tremendously in size and other factors. It is impossible to make any generalizations as to the competitiveness, profitability, etc. of these companies, and generalizations as to any financial difficulties which might be experienced by this sector.

Information obtained for this industry from Statistics Canada shows the following financial information for this industry in Ontario in 1985:

- value of shipments: $1.45 billion;
- value added: $573 million;
- cost of materials: $854 million;
- salaries and wages: $173 million;
- cost of fuel and electricity (used in manufacturing): $26 million.

5.15.2 COMPLIANCE COSTS

The facing table demonstrates the costs for the Ontario other chemical products industry to comply to proposed changes to Regulation 308.

The approximate total capital cost per plant in this industry will be about $0.6 million under scenario A and B, and $0.5 million under scenario C. The accompanying annual operating costs will be about $0.3 million per plant under scenario A and B, and about $0.1 million under scenario C.

The net present value of these costs per plant is approximately $1.3 million under scenario A and B, and $0.7 million per plant under scenario C. The uniform annual cost per plant will be $0.2 million per plant under scenario A and B, and $0.1 million per plant under scenario C.

The uniform annual cost per tonne produced (calculated at industry capacity) is about $82 per tonne under scenario A and B, and $42 per tonne under scenario C.

The econometric models of Informetrica indicate that compliance costs to the petrochemicals manufacturing industry in Ontario could represent up to 9.6% of the value added of the industry under scenario B. Grouped under the petrochemicals

manufacturing heading are the organic chemical industry, plastics and synthetic resins, paint and varnish, printing ink, and other chemicals.

The percentage of value added which compliance costs would represent to the petrochemical manufacturing industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- scenario A: 2.4% in 1989, to 9.5% in 1993, to 6.7% in 2005;
- scenario B: 2.4% in 1989, to 9.6% in 1993, to 6.8% in 2005;
- scenario C: 1.5% in 1989, to 5.7% in 1993, to 3.9% in 2005.

However, other chemicals are only one component of the petrochemicals manufacturing industry, and these numbers may not accurately reflect the impact of compliance costs on the value added of other chemicals industry only.

5.15.3. CONCLUSIONS

Due to the wide variety of companies and products produced in this sector, a more in-depth analysis is required to come to any conclusions as to any financial difficulties which might be experienced by this industry in Ontario.

COMPLIANCE COSTS

DRY CLEANING

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	97.9	97.9	97.9
• per plant	0.082	0.082	0.082
Annual Operating Costs:			
• total sector	9.8	9.8	1.0
• per plant	0.008	0.008	0.0008
Monitoring costs			
Capital cost:			
• total sector	5.9	5.9	5.9
• per plant	0.005	0.005	0.005
Annual Operating Costs:			
• total sector	2.2	6.7	0.5
• per plant	0.002	0.006	0.0004
Total:			
Capital cost:			
• total sector	103.8	103.8	103.8
• per plant	0.09	0.09	0.09
Annual Operating Costs:			
• total sector	12.0	16.5	1.5
• per plant	0.01	0.01	0.001
Net Present Value per plant	0.06	0.08	0.02
Uniform Annual Cost per plant	0.008	0.01	0.003

Compliance Costs Per tonne of clothing processed

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Cost per tonne of clothing processed	275.00	350.00	100.00
• as a % of value added	1.8 to 7.4%	2.1 to 9%	1 to 3.8%
• as a % of profit	41%	52%	15%

5.16 DRY CLEANING

Our main source of information for this industry consisted of an industry representative from one of Ontario's dry cleaning companies.

The Waste Management Branch of the Ontario Ministry of the Environment has recently produced a study on the dry cleaning industry in Ontario. Unfortunately, we have not as yet received authorization to obtain a copy.

5.16.1 OVERVIEW OF THE SECTOR

There are approximately 1200 dry cleaning plants in Ontario. According to industry representatives, approximately one half of these are central plants, to which several dry cleaners send clothing to be processed, and the remaining half are plants located on site at individual dry cleaners.

The dry cleaning industry is price competitive; however, this competition will vary from area to area.

Proposed regulations would require that dry cleaners in Ontario install closed systems. Very few dry cleaners in Ontario have closed systems at the present time.
Industry representatives and the Pollution Probe Foundation suggest that solvent use could be reduced by as much as 30% by improving housekeeping techniques, replacing gaskets, etc. This reduction could be achieved with little or no capital investment on the part of dry cleaning plants, and would represent a significant cost savings to them as well. The installation of closed systems would enable the dry cleaning industry to recover and re-use three times the amount of solvent as is currently possible with conventional technology. One industry representative felt very strongly that the Ministry should mandate a more efficient use of solvents in this industry, and that the Ministry should go further than simply mandating technology. The manner in which the technology is used will affect its efficiency to reduce emissions.

According to an industry representative the cost of processing a tonne of clothing for an average plant is approximately $400.00. This figure includes a solvent cost of approximately $100.00, and a labour cost of approximately $300.00. These costs do not include the significant labour cost for "finishing". The sales revenue per tonne of clothing processed for a dry cleaner is on average between $6,600.00 and $7,000.00. However, only 10% to 12% of this amount would be profit.

5.16.2 COMPLIANCE COSTS

The facing table demonstrates the costs for the Ontario dry cleaning industry to comply with proposed changes to Regulation 308.

The total abatement and monitoring capital cost per plant is $0.09 million under all

scenarios. In addition the annual operating costs per dry cleaning plant will be $0.01 million under scenario A and B, and $0.001 million under scenario C.

The net present value of these costs per plant is $0.06 million under scenario A, $0.08 million per plant under scenario B, and $0.02 million per plant under scenario C. The uniform annual cost per plant will be about $0.008 million under scenario A, $0.01 million per plant under scenario B, and $0.003 million per plant under scenario C.

The uniform annual cost per tonne of clothing processed is about $275 under scenario A, $350 per tonne under scenario B, and $100 per tonne under scenario C.

The total sales revenue per tonne of clothing processed for a dry cleaner, converted to 1986 dollars, is between $6106 and $6476. An industry representative has informed us that between 10 and 12% of this amount, or between $629 and $755, represents profit to the dry cleaner. The uniform annual cost per tonne of clothing processed represents between 13% and 56% of this profit.

The econometric models of Informetrica indicate that compliance costs to the dry cleaning industry of Ontario could represent up to 9% of the value added of the industry under scenario B. The percentage of value added which compliance costs would represent to the dry cleaning industry in Ontario between 1989 and 2005 are as follows under all three scenarios:

- scenario A: 1.8% in 1989, to 7.4% in 1993, to 5.3% in 2005;
- scenario B: 2.1% in 1989, to 9% in 1993, to 6.6% in 2005;
- scenario C: 1% in 1989, to 3.8% in 1993, to 2.2% in 2005.

The Informetrica model also seems to suggest that compliance costs would have a significant impact on the dry cleaning industry.

5.16.3. CONCLUSIONS

All three scenarios pose major difficulties for the dry cleaning industry, if they relied solely on abatement equipment and monitoring to ensure compliance. However, there appears to be significant potential for this industry to improve its emissions through a variety of "house-keeping" steps. This house-keeping would not only reduce the emissions, but would also capture used solvent which can be re-cycled and thus has some value to the dry cleaners.

5.17 PRIVATE WASTE INCINERATION

5.17.1 OVERVIEW OF THE SECTOR

The private waste incineration industry in Ontario comprises 3 companies. Two of these companies, Anachemia and 3M, incinerate non-hazardous waste, and the third, Tricil, is the only hazardous waste incineration facility in Ontario.

Anachemia is mainly involved in the recycling of solvents. They have recently completed the development of an incinerator for their own still bottoms. The incinerator is used only for the company's own wastes, which are generated during the recycling of solvents. Their clients are from both public and private sectors. Solvent recycling in Ontario is a very competitive business, but Anachemia does have a near monopoly in the recycling of chlorinated solvents, and may therefore be able to pass on a certain percentage of cost increases to consumers.

Anachemia Solvents had sales in Canada of $4.25 million in 1987, $3.5 million in 1985, and $3.3 million in 1983.

The waste incineration plant at 3M has been in operation for 1 year. About 15% of the waste comes from 3M itself, while the remaining 85% is commercial industrial waste. Type of waste incinerated by 3M is mainly wood, cardboard and paper, though a small percentage is food waste from restaurants and shopping malls. The capacity of the 3M plant is 60 tonnes/day. While sales revenues for the past year are not available from the plant, we were informed by a representative that they are presently losing money. Run times for the plant are presently very poor.

There is only one privately owned hazardous waste treatment and disposal company in Ontario. This company is Tricil, co-owned by CIL and Trimac. However, CIL and Trimac are currently engaged in a legal suit as Trimac wishes to buy out CIL and sell Tricil to Laidlaw Transportation. Tricil is a large operator, and accounts for 92% of all wastes which were sent to commercial and public landfills in 1986.

Opinions vary as to the expected life of the Tricil landfill. Current volumes of landfilling are much higher that original projections, so the expected life of 20 years may be shortened to as little as 10. However, Tricil growth statistics indicate a trend toward decreasing landfill use as a waste management option.

All of Tricil's hazardous waste facilities have undergone technological modifications within the past 2 years. In Ontario Tricil has been developing the first Canadian designed rotary kiln to incinerate waste at their Moore Township facility. This project represented Tricil's major capital expenditure in 1987, costing between $10 and $20 million.

The 1987 sales of Tricil were 94.5 million, according to Dun & Bradstreet. Sales increased from $74.4 in 1985. Much of this increase can be attributed to the acquisition of 5 solid waste collection and industrial hazardous waste management businesses in 1986. The acquired companies operate in Alberta, Quebec, New York, Texas, Louisiana and Florida. Companies in the hazardous waste management

COMPLIANCE COSTS

PRIVATE WASTE INCINERATION

($ millions 1986)

SCENARIO / COST TYPE	A	B	C
Abatement Costs:			
Capital cost:			
• total sector	8.9	8.9	0.03
• per plant	3.0	3.0	0.01
Annual Operating Costs:			
• total sector	0	0	0
• per plant	0	0	0
Monitoring costs			
Capital cost:			
• total sector	0.9	0.9	0.9
• per plant	0.3	0.3	0.3
Annual Operating Costs:	0.2	0.2	0.2
	0.07	0.07	0.07
Total:			
Capital cost:			
• total sector	9.8	9.8	0.9
• per plant	3.3	3.3	0.3
Annual Operating Costs:			
• total sector	0.2	0.2	0.2
• per plant	0.07	0.07	0.07
Net Present Value per plant	0.9	0.9	0.4
Uniform Annual Cost per plant	0.1	0.1	0.07

Costs Per tonne

($ 1986)

SCENARIO / COST TYPE	A	B	C
Uniform Annual Cost Per tonne	5.00	5.00	2.00

division treat approximately 300,000 tonnes of hazardous waste yearly, at a cost of approximately $200 per tonne.

A breakdown of Tricil's revenue is as follows:

- transportation: 50% (garbage 37%, chemical 13%);
- landfill: 11% (garbage 2.5%, chemical 8.5%)
- process: 36% (treat 19.5%, destroy 16.5%)

The outlooks for Tricil in the hazardous and non-hazardous waste management markets is positive. Tricil has made numerous acquisitions in the past years which have extended their market to the U.S.. In addition, Tricil has developed new lines of business. For example, Tricil Environmental Response Inc. engages in site restoration, emergency marine spill response, in-plant vacuum truck services and hazardous waste transport, solvent recycling and resale, etc..

5.17.2 COMPLIANCE COSTS

The facing table demonstrates the compliance costs for the private waste incineration industry.

The total abatement and monitoring capital cost per plant would be $3.3 million under scenarios A and B, and $0.3 million per plant under scenario C. The accompanying annual operating costs would be $0.07 million per plant under all three scenarios.

The net present value of these costs per plant is about $0.9 million per plant under scenario A and B, and $0.4 million per plant under scenario C. The uniform annual costs per plant will be about $0.1 million under scenario A and B, and $0.07 million per plant under scenario C.

The uniform annual costs per tonne of waste (calculated at industry capacity) will be about $5 per tonne under scenario A and B, and $2 per tonne under scenario C.

The Informetrica models did not calculate the impact of compliance costs on the value added of the private waste incineration industry in Ontario.

5.17.3 CONCLUSIONS

The "per tonne" costs which would fall on this sector represent a small percentage of the prices which these companies charge for disposal of wastes. However, the capital expenditure required is almost equal to the annual sales of one of the companies (Anachemia).

Waste incineration companies in Ontario tend to have quite dominant market positions, and generally probably have the capacity to pass on small costs to thier customers.

6.0 A COMPARISON WITH THE U.S.

Several industry representatives have stated in their submissions to the Ministry that the proposed revisions to regulation 308 may place them at a competitive disadvantage relative to producers in the United States, other Canadian provinces, and other countries worldwide. These representatives are of the view that regulations proposed in Ontario are more strict than any other regulations in place worldwide.

Because industry has stressed this point, we have done a very preliminary comparison of the Canadian and U.S. regulations, and have included a brief overview of the U.S. experience with conventional air pollutants.

The first section provides a preliminary overview of air pollution regulations in the United States. The second section provides a brief summary of U.S. experience in assessing the costs of air pollution regulations. The U.S. Federal government has been relatively inactive in dealing with hazardous or toxic emissions. Therefore, the U.S. experience with compliance focuses mainly on experience with conventional pollutants.

6.1 U.S. AND ONTARIO AIR POLLUTION REGULATIONS

Air pollution regulation in the United States has been achieved primarily under the Federal Clean Air Act of 1970, as amended in 1977. The Clean Air Act sets forth a fabric of requirements that are implemented by the U.S. Environmental Protection Agency and, in some cases, by the States. States have also developed their own air pollution control programs, many of which address toxic air pollutants.

The Clean Air Act addresses what are termed "criteria pollutants" and "hazardous air pollutants. Criteria pollutants have been subject to comprehensive and broad Federal control programs since the early 1970's. Federal regulation of hazardous air pollutants has not been successfully accomplished in any comprehensive manner to date.

Criteria pollutants are those for which EPA is required to establish ambient air quality standards. Such ambient standards have been established for carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, particulate matter, and lead. Compliance with these standards must be demonstrated by the States. Each State must submit (for EPA approval) a State Implementation Plan which details the control measures that will be adopted and enforced for new and existing sources in the state to achieve compliance with the standards.

To assist in facilitating compliance with ambient standards for criteria pollutants, the Act mandates federal requirements for certain sources. Thus, new motor vehicles must meet must meet Federal emission standards. The lead content in motor fuel is regulated pursuant to Federal standards. New, major, stationary sources of emissions are subject to Federal New Source Performance Standards. In addition, such new, stationary sources are subject to Lowest Achievable Emission

Rate (LAER), in areas not meeting ambient air quality standards, and Best Available Control Technology (BACT), in areas that are in compliance with ambient standards. These technology decisions are made on a case-by-case basis.

The Act sets up a separate program to regulate hazardous air pollutants. Under Section 112, EPA is required to establish Federal Emission standards for sources of hazardous air pollutants at a level which provides an ample margin of safety to protect the public health. A hazardous air pollutant is one for which an ambient air quality standard is not available and which may reasonably be anticipated to result in an increase in mortality, or in serious irreversible, or incapacitating reversible, illness. To date, EPA has prescribed emission limitations for only eight substances: mercury, asbestos, beryllium, vinyl chloride, benzene, radionuclides, inorganic arsenic, and coke oven emissions. A number of these standards were promulgated in the early 1970's and do not reflect currently available technology. Some of the standards consist primarily of workplace practices and monitoring programs, which require little technology, and most of the standards do not cover all of the sources of the pollutants in question.

A recent Court decision held that the EPA must not consider costs and technological feasibility in establishing an acceptable level of risk for a pollutant listed as hazardous. These factors can only be considered in establishing an acceptable margin of safety. Thus, EPA currently is in the process of developing a new policy for establishing acceptable levels of risk for regulating hazardous air pollutants. Many experts believe that this should result in more stringent control of hazardous air pollutants, but it is not likely to speed up the process of regulation. Thus, there are continuing efforts in Congress to amend the act to force more expeditious and comprehensive Federal regulation of hazardous air pollutants.

As a result of EPA's relative inactivity in this area, expenditures for compliance with Federal hazardous air pollutant requirements has not been a significant proportion of the annual expenditures for air pollution control. The May 1988 Survey of Current Businesses, published by the U.S. Commerce Department, estimates 1986 annual air pollution control expenditures at just over 33 billion dollars. The costs are not disaggregated into criteria pollutants and hazardous air pollutants. Thus, further research is necessary to determine how much expenditures are devoted to control of air toxics. A recent study, by the Congressional Research Service, estimates the total costs of proposed amendments to the Clean Air Act (establishing more stringent technology-base controls for air toxics) at about 1 billion dollars annually.

It should also be noted that EPA's inactivity in the area of hazardous air pollutants has prompted numerous states to establish programs to regulate air toxics. About 27 states currently have air toxic control programs in place and another 21 states have informal or developing programs. These programs are varied in their approaches, some establishing ambient air standards or guidelines for air toxics, others relying on case-by-case risk assessments, still others prescribing state-wide control technology requirements. Some states regulate existing and new sources, while others only require new sources to meet those requirements. New Jersey, California and Massachusetts are the leaders in establishing these programs. Most of these programs have emerged in the 1980's. To date, no comprehensive

analysis of these programs has been conducted and no estimate of the costs of compliance with these programs has been published.

Finally, the U.S. public's awareness of toxics, in the air and water and on land, will soon be considerably enhanced by the publication of the toxics release inventory required under Title III of the Superfund Amendment and Reauthorization Act (SARA). Sources of a certain size engaged in manufacturing, processing or using nay of a list of 329 chemicals, are required to report annual releases of these chemicals to EPA and the States. EPA is required to place this information in a database for review by the public. Both the costs of complying with the reporting requirements, and the additional costs of what are likely to be a plethora of new legislative and regulatory programs to reduce toxic releases at the Federal, state and local levels, will need to be factored into any long term analysis of the economic impacts of air toxics regulation.

6.2 U.S. INDUSTRIAL EXPERIENCE IN COMPLYING WITH REGULATIONS ON CONVENTIONAL AIR POLLUTANTS

Air Pollution Control Costs Since 1970: Overview

Major legislation enacted in 1970 for air (and 1972 for water) set in motion a broad regulatory program that imposed significant costs to U. S. industry during the 1970s and beyond. Although critics ascribed significant adverse economic effects to these regulations, other basic upheavals in the basic manufacturing industries--increased energy prices, lowered domestic and international demand for manufactured goods, monetary policy and exchange rate gyrations, and the advent of significant foreign competition--probably swamped the cost of the environmental regulations. Nevertheless, several industrial sectors were faced with significant burdens during the early years of the regulatory programs. Some sectors--notably steel production and copper smelting--received legislative relief from the regulations due to their precarious financial conditions and prospects for shutdown and unemployment.

The economic impacts of air pollution regulation has declined as a more stable program of standards and regulatory procedures operates. Business decisions routinely involve environmental considerations. The economy has largely adapted to the current rules, and, although the process remains necessarily contentious, the regulators and the regulated have become more adept in their respective roles.

Retrospective Cost Studies in Air Pollution Control

The United States has accumulated eighteen years of experience with federally imposed and state implemented ambient air quality standards. During the same period, various federal government agencies, business trade associations, interested academicians, and private research institutions produced many estimates of the direct cost and subsequent economic effects of industrial air pollution control. Several publications have been devoted to collecting, synthesizing, and interpreting these studies.

Many of these studies covered the late 1970s and early 1980s, when concern over the potentially adverse economic affects of the air pollution control programs

climaxed.[1] During this period economic growth declined from historic rates, the regulatory system was still evolving through the standard-setting stages and attendant court battles, sources built prior to the Clean Air Act faced the initial regulatory requirements, and overall compliance costs were high relative to other measures of economic activity. This concern has subsided somewhat, as a relatively mature environmental program has become a fact of life for both the regulators and regulated firms. According to most sources, measured impacts from pollution control have declined.[2] In addition, there may have been a decrease in regulatory intensity and enforcement activity during the 1980s, reflecting the low budgetary priority given to the Environmental Protection Agency d ing the Reagan administration. Although the EPA and state governments have continued to promulgate new regulations under existing authority, the Congress has not significantly modified the Clean Air Act for over a decade.

Not only were regulatory costs relatively higher in the 1970s, but so were the initial cost estimates relative to eventual measured performance.[3] This appears to be a consistent bias, not simply uncertainties associated with ex ante modelling and ex post measurement. Among the reasons for the bias are the engineering basis for the cost estimates that did not allow for economic behaviour (including noncompliance), technical improvements in abatement equipment, and regulatory adaptation regarding compliance schedules and requirements.

Much of the information contained in the initial regulatory cost studies may be somewhat dated. However, some studies may remain relevant to the consideration of potential changes in Ontario, at least to the extent that such changes may mimic the earlier operation of the Clean Air Act. During the 1970s, many existing sources incurred costs in order to achieve initial attainment of National Ambient Air Quality Standards (NAAQS). During the 1980s and beyond costs due to new source requirements (New Source Performance Standards, or NSPS, which are largely independent of ambient standards) begin to predominate.[4]

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[1]See, for example, The Status of Environmental Economics: An Update (July, 1979) and The Status of Environmental Economics: The 1984 Update (November, 1984), prepared by the Congressional Research Service for the Committee on Environment and Public Works U. S. Senate.

[2] See Environmental Regulation and Economic Efficiency (Congress of the United States, Congressional Budget Office, March, 1985).

[3]See Comparisons of Estimated and Actual Pollution Control Capital Expenditures for Selected Industries, prepared for the EPA by Putnam, Hayes and Bartlett, Inc., June 1980.

[4]An important exception to this occurs in the case of the potential control cost of ozone and carbon monoxide in urban areas that fall far short of the ambient air quality standard. Attainment proposals are being currently debated by Congress, and any resulting control costs should be ascribed to meeting existing air quality goals. Much of this control would involve mobile sources, which already account for roughly one-third of air pollution control cost.

For new federal regulations, the process of developing cost projections was formalized with Executive Order 12291, signed by President Reagan in February 1981. Under this order, all proposed regulations must be supported by a Regulatory Impact Analysis (RIA) if it is likely to have significant economic affects. Such effects include annual costs of $100 million or more, major price increases, and adverse trade consequences; however, RIAs are sometimes developed for proposals that do not attain these thresholds. RIAs constitute important sources of information for new and proposed air pollution controls. In particular, recent RIAs address potential changes in current ambient air quality standards for the "criteria" pollutants. However, the main requirements of the Clean Air Act relating to stationary sources and ambient air quality were largely in place when RIAs were mandated. RIAs tend to focus on a specific regulatory proposal; these may or may not be similar to proposals in Ontario.

Historical air pollution control costs have been surveyed or estimated for major industrial sectors by various agencies; all of these sources exhibit well recognised inherent limitations. They include:

o Survey of Current Business reports produced by the Bureau of Economic Analysis (BEA) of the Department of Commerce. The most recent version (published in February 1986) contains revised estimates for 1973-1983 along with estimates for 1984;

o Pollution Abatement Cost and Expenditures published by the Bureau of the Census of the Department of Commerce. The most recent assessment, which included detailed manufacturing industry breakouts of costs incurred in 1984, was published in May, 1986;

o Environmental Quality, published annually by the Council on Environmental Quality (CEQ) sporadically includes estimates of current and future air pollution control costs.

o Annual McGraw-Hill Survey of Pollution Control Expenditures, published yearly, provides estimates of capital cost incurred by selected industrial sectors;

o The Cost of Clean Air issued by the Environmental Protection Agency every five years. The most recent version was published in 1984, and includes detailed estimates of 1981 industry expenditures, along with earlier estimates and projections of spending through 1990.

In the U.S, these abatement cost data have been used as inputs into macroeconometric or input/output models of the national economy in order to assess the overall economic impact. Such efforts have been essentially inconclusive, showing both negative or slight positive effects on traditionally measured economic performance such as GNP, productivity indices, employment,

prices.[5] Aggregate model results tend to be far more dependent on the inherent biases and underlying structural relationships embodied in a specific approach than on the actual level of environmental expenditures used.

Instead of focussing on aggregate expenditure and economic effects, the data may provide reasonable estimates of sector-specific costs. Comparing the control costs against sectoral data on value added, sales, and capital expenditures, one might be able to estimate the relative influence of air pollution regulations the financial condition of particular industries. The relevance of such comparisons would depend on the similarity of standards enforced under the Clean Air Act and those proposed for Regulation 308.

In terms of sectoral effects in general, a few dramatic cases--such as electricity generation, iron and steel production, and copper smelting--tend to obscure the fact that expenditures on air pollution control rarely exceed a small percent of capital expenditure or operating costs in many industries. At first blush, therefore, it is difficult to imagine large adverse effects being ascribed to such regulation. For example, in 1978 the Council on Environmental Quality found that 118 plant closings that occurred between 1971 and 1978 may have been due, in part, to environmental requirements. However, in cases where closures occurred, and environmental regulation was listed as one factor in the decision, the plant was typically old, less productive, and barely profitable irrespective of looming emission control requirements. Thus, although regulations may be listed as the proximate cause of some shutdowns, it is probably quite rare that they are the only, or even the main, cause of a plant closure.

Selected General Sources:

Novick, Sheldon M., ed. Law of Environmental Protection, Environmental Law Institute (New York: Clark Boardman Co. Ltd, 1987).

The Regulation of Toxic and Oxidant Air Pollution in North America, A joint project of The Canadian Environmental Law Research Foundation, Toronto, and The Environmental Law Institute, Washington, D.C. (CCH Canadian Limited, 1986).

Economic Effects:

Peskin, Henry M., Paul R. Portney, Allen V. Kneese, ed., Environmental Regulation and the U. S. Economy, (Baltimore: Johns Hopkins University Press for Resources for the Future, 1981).

U. S. Congressional Budget Office, Environmental Regulation and Economic Efficiency (Washington, D.C. 1985).

Rose, Adam, "Modeling the Macroeconomic Impact of Air Pollution Abatement," Journal of Regional Science, Vol. 23, No 4, November, 1983.

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[5]A good explanation of these results is found in Rose (1983). Another listing of the basic results of 19 such studies can be found in Environmental Regulation and Economic Efficiency (Congressional Budget Office, March, 1985). See also Peskin, et. al. Environmental Regulation and the U.S. Economy (1981).

Congressional Research Service for the Committee on Environment and Public Works U. S. Senate, The Status of Environmental Economics: An Update (July, 1979) and The Status of Environmental Economics: The 1984 Update (November, 1984).

Sectors Most Affected by Air Pollution Controls

Experience with Air Pollution Control in the Iron and Steel Industry

Most air pollution control regulations affecting the U.S. iron and steel industry are derived from ambient air quality standard attainment, not New Source Performance Standards. This is simply because so few new plants have been built in the last two decades. However, recent (1984) listing of coke oven emissions for National Emission Standards for Hazardous Air Pollutants (NESHAP) may prove significant.

Responding to the requests of the iron and steel industry for compliance deadline extensions regarding the installation of pollution control equipment, Congress passed the Steel Industry Compliance Extension Act (SICEA) in July, 1981. Companies seeking relief under this legislation are required to invest in other capital improvements to the extent that would have invested in abatement equipment under the previous compliance deadlines.

Recent Surveys of Actual Air Pollution Control Expenditures

In "Plant and Equipment Expenditures by Business for Pollution Abatement" Survey of Current Business (U.S. Dept of Commerce, Bureau of Economic Analysis, February, 1986) capital expenditures for air pollution control were recorded in the "blast furnace, steel works" category. In Pollution Abatement Costs and Expenditures, 1984, (U.S. Department of Commerce, Bureau of the Census, May, 1986) A detailed accounting of capital expenditures and annual operating pollution control costs are given for the "blast furnace and basic steel products" as well as the "iron and steel foundries" categories for 1984. An accounting of capital and annual control costs are also available for "primary metal industries" for the period 1980-1984 (Table 1) and comparisons between Census and BEA are provided (Table A).

All sources show that air pollution expenditures for the iron and steel industries (and all primary metals) peaked in the late 1970s or very early 1980s, and have declined since. At its peak, however, industry air pollution control spending was a significant fraction of total capital expenditures.

For example, Cost of Clean Air (EPA) calculates annual air pollution control cost for iron and steel at $1,213 million in 1981. By 1984, however, Bureau of Census records only $55 million (blast furnace and basic steel) and $16 million (iron and steel foundries) in capital expenditures; plus $467 million (blast furnace and basic steel) and $125 million (iron and steel foundries) in operating costs. Total annual costs of air pollution abatement, therefore, were $663 million. By the

mid 1980s, it appears that the bulk of air pollution capital was in place in the iron and steel industry.

Selected Sources:

Congress of the United States, Congressional Budget Office, How Federal Policies Affect the Steel Industry (February, 1987).

Arthur D. Little, Inc., Environmental Policy for the 1980s: Impact on the American Iron and Steel Industry, (Report to the Iron and Steel Institute, 1981)

United States Environmental Protection Agency, "The Cost of Clean Air 1984"

GCA Corporation, Reconciliation of Estimates of Investments by Iron and Steel Industry in Pollution Control Equipment, prepared for the U.S. EPA, March 1983.

Air Pollution Control Costs in the Pulp and Paper Industry

Estimates of the impact of air pollution control regulations in the pulp and paper industry tend to be dwarfed by applicable water pollution control expenditures, since water pollution control accounts for roughly 80 percent of abatement costs. In an 1977 Arthur D. Little analysis, the estimated capital expenditures in this industry on air pollution control of existing sources was $690 million between 1975 and 1977, and predicted an additional $170 million on existing plants between 1977 and 1983. These costs are attributed to attaining ambient air quality standards. Capital costs for new plants were estimated at only $30 million (1975-1977) and predicted at $120 million (1977-1983). Total capital expenditures on air pollution control over the 1975-1983 period were $1.0 billion, or roughly $110 million per year in 1977 dollars.

Operating costs due to ambient air quality regulation were estimated at $1.80 per ton produced (1975 dollars, with an average paper price of $292 per ton). This was predicted to decline to $0.40 per ton over the 1978-1983 period.

The 1984 Cost of Clean Air reports $363 million in annual cost incurred in the pulp and paper industry in 1981. These figures are probably updates and revision of the ADL estimates. Other figures, in 1981 dollars include total annual costs 1970-1978 ($1.1 billion, or $120 million per year), 1979-1981 ($1.0 billion, or $350 million per year) and projected 1981-1990 ($3.9 billion, or $390 million per year).

Recent Surveys of Actual Air Pollution Control Expenditures

In "Plant and Equipment Expenditures by Business for Pollution Abatement" Survey of Current Business (U.S. Dept of Commerce, Bureau of Economic Analysis, February, 1986) the following capital expenditures for air pollution control were recorded in the "paper" category. In Pollution Abatement Costs and Expenditures, 1984, (U.S. Department of Commerce, Bureau of the Census, May, 1986) An accounting of capital expenditures and gross annual pollution control costs are given for the paper industry over the period 1980-1984 (Table 1) and comparisons between Census and BEA are provided (Table A).

The figures generally confirm the ADL projections, with capital expenditure figures during the early-to-mid 1970s at over $200 million per year, and declining in the late 1970s and early 1980s to $150-$200 million per year. Preliminary 1984 data indicates a slight increase in abatement capital, but this is most likely due to new plant construction. Virtually all capital expenditures are devoted to particulate control. Sulfur dioxide control is achieved predominantly by low sulfur fuel. In 1984, Census data indicates that the pulp and paper industry spent $281 million on air pollution operating costs, which include low sulfur fuel premiums, particulate control equipment operation and maintenance, and depreciation on pollution control equipment.

Source:

Economic Impacts of Pulp and Paper Industry Compliance with Environmental Regulations by Arthur D. Little, Inc,. for EPA June 1977. Executive summary printed in "Status of Environmental Economics: An Update," Committee on Environment and Public Works United States Senate, July 1979.

Air Pollution Control Costs in the Primary Copper Industry

The primary copper industry in the United States has been adversely affected by the Clean Air Act, even though the industry has been afforded special treatment in the form of Nonferrous Smelter Orders (NSOs) allowed in the Clean Air Act Amendments of 1977. This status reflects the combination of the effluent intensive nature of copper smelting with the precarious economic condition of the industry during the last fifteen years.

The primary airborne effluent from copper production is sulfur, typically emitted from smelters as sulfur dioxide (SO_2). The most common abatement method is to construct a plant that converts SO_2 into sulfuric acid. Since no new copper smelters have been built in the last decade, virtually all direct air pollution control costs are incurred in order to achieve the ambient air quality standard for SO_2. However, most of the U.S. copper industry is located in western states subject to strict Prevention of Significant Deterioration (PSD) requirements which could limit potential capacity expansion. Since the U.S. copper industry has experienced production declines over the last fifteen years, the PSD requirements may not have had much effect. The last new smelter began operation in 1976.

Of potential relevance to Ontario's proposed arsenic standard is the U.S. experience with a proposed National Emission Standard for Hazardous Air Pollutants (NESHAP) standard for inorganic arsenic that may have contributed to the shutdown of an Asarco plant in Tacoma, Washington. An account of this episode can be found in The Regulation of Toxic And Oxidant Pollutants in North America, pp. 159-161.

There are several recent estimates of the direct cost of air pollution control for the copper industry. They include the 1984 Cost of Clean Air (COCA), the 1986 Current Industrial Reports (Census of Manufactures), and (for nonferrous metal industries) most recent McGraw Hill survey.

The estimates in the 1984 COCA are based on the Arthur D. Little (ADL) study referenced below. The original ADL estimates had been adjusted for conditions experienced by the copper industry. The COCA estimates that the primary copper smelting industry spent $416 million in 1981 (in 1981 dollars). However, the Census of Manufactures reports that the primary copper production sector spent only $39.5 million (capital) and $126.6 million (operation and depreciation) by 1984, with $24 million in cost recovered from air pollution control. Either the total cost to the industry has fallen substantially, or profound differences in methodology obscure meaningful comparisons.

ADL also estimated the economic impacts of pollution control expenditures in the copper industry. Under the assumptions in the 1978 study, the prices of copper were predicted to be raised by between 29 and 39 percent by 1987. This price increase was to be accompanied by production and employment reductions of between 25 and 33 percent in 1987. Whether or not such economic impacts actually occurred due to pollution control is difficult to assess, since a host of other factors--macroeconomic conditions, worldwide copper demand, and copper imports--probably dominate the effects of pollution control on the financial condition of the U.S. copper industry. However, it is reasonable to assume that pollution control requirements have had a significantly adverse effect on the industry.

Sources:

The following sources comprise related elements of a large study performed by Arthur D. Little Inc. in the late 1970s

Department of Commerce, Industry and Trade Administration "The Potential Economic Impact of United States Regulations on the Copper Industry" April 1979.

Environmental Protection Agency, "Economic Impact of Environmental Regulations on the United States Copper Industry" January 1978.

Raymond Hartman, Kirkor Bozdogan, and Rivindra Nadkaini, "The Economic Impacts of Environmental Regulations on the U.S. Copper Industry," The Bell Journal of Economics, vol. 9 (autumn, 1979).

Air Pollution Control Costs for Electric Utilities

The electric utility sector in the United States have incurred the largest air pollution control costs of any industrial sector. The primary reason is the reliance on fossil fuel fired generation, particulary coal. The major emissions subject to ambient air quality standards are sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulates. Many studies of air pollution control costs exist, both for current and proposed regulations.

The costs of air pollution control for any given electric utility plant is a function of, among other things, the fuel burned (coal, oil, or gas), the age of the

unit and corresponding regulatory treatment, geographic location (which determines fuel premiums), local air quality that determines the stringency of the performance standard necessary to attain the NAAQS, and the installed pollution control equipment such as electrostatic precipitators and scrubbers.

A comprehensive study on electric utility pollution control was prepared by Temple, Barker, and Sloan (TBS) for the EPA in 1981. TBS computes the average annualized pollution control cost for electric utilities at 3.88 mills per kilowatt hour of generation (in 1979 dollars). About 70 percent of this (2.72 mills per kWh) was attributed to SO_2 control, due in large part to price premiums paid for lower sulfur fuels. Particulate controls accounted for an additional 11 percent of the total, with the remaining 19 percent attributed to chemical and thermal discharge control.

Since most electric utility plants are regulated private firms, the cost of pollution control requirements translated directly into electricity rate increases. Therefore, the annual cost figure is close to the 3.2 mill per kWh calculated by TBS as the impact on electricity prices. Scaling this figure to 1985 dollars yields 4.6 mills/Kwh. National average electricity rates are were 70.4 mills/kWh in 1985[6] Thus, electricity prices are roughly 7 percent higher due to environmental regulation.

Aggregate annual control costs in 1981 were $7.5 billion, according to Cost of Clean Air. This compares with operating revenues received in 1985 of $135.3 billion[7]

Selected Sources:

Temple, Barker, and Sloan, Inc. Environmental Regulations and the Electric Utility Industry, Prepared for the EPA July 1981.

The Economic and Financial Impacts of Environmental Regulations on the Electric Utility Industry Prepared for the Edison Electric Institute by ICF, Inc. February, 1980.

Congressional Budget Office, The Clean Air Act, the Electric Utilities, and the Coal Market, April, 1982

Congressional Budget Office, Curbing Acid Rain: Cost, Budget, and Coal-Market Effects, June, 1986.

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[6]See Annual Outlook for U.S. Electric Power 1987, Energy Information Administration, Department of Energy, May, 1987 for electricity prices.

[7]See Financial Statistics of Selected Electric Utilities 1985, Energy Information Administration, Department of Energy, February, 1987.

APPENDIX A: PRESENTING THE COMPLIANCE COSTS TO INDUSTRY

1. INTRODUCTION

- The costs should be calculated and presented in a way that is similar to how the individual companies would do the calculation, i.e. how the company will see the expenses.

- Net present value (NPV) will be used to summarize the overall costs, while uniform annual cost (UAC) will be used in the presentation of compliance costs as percentages of profits, production costs, etc.

2. COSTS FOR THE NPV ANALYSIS

- divided into two streams: capital and (o&m + monitoring)

- the (o&m + monitoring) stream of costs begins the year after the capital expenditure is incurred

- the capital stream will take place in one year.

3. REVENUES FOR THE NPV ANALYSIS

- The only revenues are tax liability reductions resulting from both the capital and the (o&m + monitoring) cost streams

- Tax reductions for the (o&m + monitoring) stream will be taken in the year in which the expenditures are incurred. Rate to be used for all industries: 40%.

- Tax reductions for the capital stream will be taken according to the following schedule, as determined by class 27 in the regulations of the Income Tax Act:

    - 25% in year 1, i.e. the year of incurring the expenditure
    - 50% in year 2
    - 25% in year 3.

- This accelerated tax treatment will be applied to only the capital part of the SENES figures for capital cost. INFORMETRICA has assumed that, on average, about 80% of the SENES estimates are for equipment, with the remaining 20% going to build the structure housing the equipment. We will use this ratio.

4. TIMING

- The analysis is carried out over a 15-year period. Thus, the life expectancy of the equipment is assumed to be 15 years.

5. DISCOUNT RATE

- A discount rate of 10% will be used.

6. LIMITATIONS TO THIS ANALYSIS AND SET OF ASSUMPTIONS

The assumptions used above represent an effort to carry out an analysis which will be useful to all of the different categories of industries which have been examined in this study. However, the industries differ widely among themselves, and the circumstances of the individual companies within a sector also vary significantly. Thus, it is important to appreciate the limitations of this analysis, as summarized below.

- The assumption of a benefit stream, i.e. reduction in tax liabilities, is only applicable in cases in which a company is paying taxes. Companies showing losses, for example, may not pay taxes, and so a reduction in tax liabilities is of little value.

- The assumption of a 40% tax rate is a generalization. Some of the sectors consist of a mix of large and small businesses, and not all will be paying tax at the same rate. In general, the lower the tax rate, then the higher the net present value of the compliance costs because the company is receiving a lower benefit, i.e. reduction in its tax liability.

APPENDIX B

INDUSTRY SUBMISSIONS

The following appendix contains a short summary of points made by industry representatives to the Ministry of the Environment on the subject of the Clean Air Program Discussion Paper. The information below does not represent a complete summary of all the issues contained in each submission; rather, only those points felt to be relevant to this particular study were included.

These summaries are not intended to reflect the opinions of the consulting team, but rather just to present the comments of industry as they were made to the Ministry.

I. DAIRY:

The only submission received from the Ontario Dairy industry was from the Ontario Dairy Council. The Council's position is that the standards being set appear very restrictive and cannot reasonably be attained. One of their members was informed by a manufacturer of drying equipment that even the newest and most advanced machinery could not meet the proposed requirements. The Dairy Council states that the proposed Ontario standards are reportedly ten times more restrictive than those found ion Wisconsin, Pennsylvania, Washington and California; however, thev have not as yet confirmed this report.

II. PULP AND PAPER

The only submission received was from the Ontario Forest Industries Association. The main points made by the Association were as follows:

- The Ontario Forest Industry is prepared to participate and cooperate with the Ministry. They are also prepared to commit the funds required by a "reasoned, rational and timely designed to reduce the impact of the industry on the province's air resource"; and

- The Industry asks that compliance for the industry be considered along with the costs of innovation, quality improvements, cost reduction and equipment and plant replacement.

III. FOUNDRIES

1. KELSEY-HAYES:

Ontario's pollution control regulations are already among the most stringent in the world. "It seems as though we are abstracting the most demanding regulations from

the standards of other countries and lumping them together...this approach to environmental management is placing Ontario industry at a significant competitive disadvantage."

All production at the Kelsey-Hayes foundry is destined for the O.E.M. automotive market, 90% of which is directly or indirectly exported. The Ontario foundry industry is struggling to compete with foundries located in the U.S. "where it seems a more realistic approach is being taken to environmental issues".

Any change in air pollution regulation requiring major capital investment and operating expenses will probably result in the phase out of the Woodstock foundry operation, eliminating 220 jobs and threatening 300 others.

2. CANADIAN STEEL ENVIRONMENTAL ASSOCIATION:

The industry must be given sufficient time to enable self-financing of the massive funding that will be required to meet the proposed regulation.

"Several aspects of the proposal may well stifle economic growth in the province. At the very least, regulation 308 as proposed will slow industrial expansion particularly in areas that have poor ambient air quality."

The proposed changes are occurring at a time when they a faced with other costly proposals in the area of environment and occupational health and safety.

CSEA believes that industry should not be required to make changes to pollution equipment every 10 years as the costs involved would be astronomical.

III. NON-FERROUS SMELTERS

1. INCO LTD.:

Over the next few years, Inco expects to be required to spend a substantial sum of money to meet the requirements of the Countdown Acid Rain Program. Having complied with the requirements of that program they feel they may find themselves unable to meet the provisions of CAP as currently proposed and thus unable to obtain a certificate to operate.

The CAP as outlined in the discussion paper could have a serious detrimental impact on Ontario's industry and could materially impair its ability to compete.

Inco is also concerned about the complexity of the approvals associated with the proposed regulation. This complexity will inevitably result in major delays in the approval system. Further delays in granting Ministerial approvals have the potential to seriously impair the industry's competitive position. They feel that the proposed changes should be implemented on a step by step basis.

The impact of the proposed regulation cannot be assessed until the hazard ratings are made public and the levels of control technology are known.

2. FALCONBRIDGE:

Each of their locations will make individual submissions.

Falconbridge has been concentrating their efforts and expenditures to comply with regulation 660/85. They anticipate that large expenditures will be required of them to meet the 1994 requirements.

The proposed changes will be costly and will require considerable time for development.

Falconbridge's Kidd Creek copper smelter uses the most technologically advanced and environmentally sound process in the world, yet it would not meet the new regulations without extensive capital and operating expense.

3. FALCONBRIDGE'S KIDD CREEK DIVISION

"Even though we have sulphuric acid plants which have proven to be the best available technology, in order to meet requirements of the CAP discussion paper as written, Kidd would have to incur additional capital and operational expenditures exceeding 100 million dollars. To put this in perspective, this would equate to profits generated from the mining and processing of 10% of our ore reserves. Even with this expenditure it does not guarantee 100% compliance with the restrictive proposed legislation due to the inability of equipment to meet all requirements."

They are concerned with the proposed two step certificate of approvals. They do not see how they can build million dollar plants without assurance that they will be able to operate them.

4. FALCONBRIDGE: SUDBURY:

The Sudbury Falconbridge smelter could not achieve compliance within the stated time frame.

"The Smelter can achieve compliance only through major process changes, beyond the scope of conventional control equipment solutions. These processes do not yet exist and require research and development."

IV. AUTOMOTIVE INDUSTRY

1. GENERAL MOTORS OF CANADA LTD.:

MOE must keep in mind that Ontario industry is facing unprecedented competitive challenges. "By 1992, many industry analysts forecast that there will be excess capacity over 3 million units or 25% of current capacity...In order to prepare itself for this challenging environment, General Motors of CAnada has made and committed to levels of capital investments in its facilities of over $8 billion since 1980". Cost competitiveness is crucial to General Motors.

"A favourable legislative and economic environment is critical to ensuring that the automotive industry continues to be the major source of economic growth in the province". General Motors is concerned that the proposed reform of reg 308 is being undertaken without full assessment of the economic impact.

The proposed time frames for implementation is completely unrealistic, even if the industry had the necessary human and financial resources.

"Ontario industry must remain competitive. Imposing the additional burden of requiring some type of control technology for all emission sources where it is not needed is inappropriate".

The requirement to include background data in modelling calculations may impose a significant burden on them due to factors beyond their control. "In addition, in cases where companies in a neighboring jurisdiction are emitting high levels, it may be impossible for companies to expand or invest in the Ontario location because of the transient emission flows on ambient air quality". This may have a serious impact on our economy, competitiveness and employment opportunities.

General Motors objects to the renewal of certificates of approval every ten years. Equipment life span often exceeds 10 years, and it would be a great burden to have to replace control equipment every ten years.

"The proposal to require installation of continuous monitoring systems on all LAER and BACTEA sources imposes an exorbitant cost penalty on industry, particularly when the technology is not available or proven for many contaminants".

The time frame proposed for compliance may be too short.

2. MOTOR VEHICLE MANUFACTURERS ASSOCIATION:

"In our industry it is extremely difficult, if not impossible, to respond to economic impact questions without having a good understanding of the ranking of the pollutants that are to be controlled, and how their dispersion will be modelled, so that the cost appropriate control technologies can be estimated with any accuracy. In this regard, our companies are considering a technical impact study, rather than an economic one at this time." p.199

V. CEMENT INDUSTRY

1. CANADIAN PORTLAND CEMENT ASSOCIATION:

"There must be a balance between emissions control and economic growth within the Province. Industry should not be required to continually install additional control equipment simply because the technology exists, when no significant improvement in air quality is possible."

The cement industry is capital intensive. "To maintain its cost competitiveness, its plants and equipment must be fully utilized. Unfortunately, many of the Discussion

Paper's options would severely penalize the industry. Potentially, it could destroy the export market."

The discussion paper proposes limiting stack height. This will be detrimental in local, short term effects in the case of upsets.

"It would seem there is no allowance made for industrial growth, in an area which may not be attaining even one specific criterion, such as TSP...Some form of offset procedure must be developed to allow for environmentally sound economic growth. It is not practical to achieve arbitrary ambient air standards within ten Years".

"The stated objective of the ambient air (airshed) provisions is to act as a second level of screening, after the imposition of recommended source control, in order to ensure that the airshed remains in compliance with the prescribed ambient air standards." This concept leads to the greatest share of the regulatory problems. If these problems are not recognized and methods of dealing with them incorporated into the legislation, the proposed legislation will cause major disruptions to the economy.

A large part of the problem arises because the Ministry fails to fully recognize or acknowledge the existing situation in Ontario. For example, the majority of reporting sights in southwestern Ontario are presently in violation of proposed standards for suspended particulate, though sources which fall under the scope of the regulation only account for 20% of the measured value. The rest was due to urban traffic and distributed sources and background influx. "Unless these other sources are controlled, there is no prospect of meeting the recommended standard, even if industry is totally controlled or shut down."

"The proposed models are very expensive to run for a multi-source situation".."The Ontario Cement industry recommends that the Ministry review the models proposed in CAP, with due consideration to the practicality of the models and the large quantity of necessary modelling data unavailable to industry."

"Continuous opacity monitoring and annual stack tests should not be automatic requirements. Many sources do not change and controls do not deteriorate, therefore emissions remain static. Annual stack tests would be a considerable burden on the industry and more importantly, there are not sufficient resources in the Province to carry out annual tests."

"Excessive demands on stack testing resources can easily mean that routine, non substantive tests would absorb stack testers' time while 'critical path' tests in start up projects would delay the issuance of operating permits".

New ambient air standards can be burdensome to existing industries. Retro-fits to existing industries are often impossible. "To reduce kiln exhaust levels for the Ontario cement industry by 50% would be almost impossible since space is not always available for the additional equipment"

The proposed level of control may cause existing plants to be closed. The cement industry requires an extended phase-in period.

VI. PETROLEUM REFINING

i. ONTARIO PETROLEUM ASSOCIATION

The main point made by the Petroleum association was that proposed changes to Regulation 308 may result in a significant impact on the Ontario economy. The OPA believes that the current air pollution control law is effective, even though it contains some weaknesses Reforms should be carried out at a reasonable pace with full consideration of their potential impact.

2. ESSO PETROLEUM CANADA

"The Ontario petroleum industry is directly tied into the international market place. The Ministry of the Environment must recognize that significantly higher costs for emissions control in Ontario could threaten the viability of the manufacture of petroleum products in Ontario".

MOE should recognize that"control technology being added to existing facilities is often much more expensive than the same technology being built into new facilities."

"The amendments should address the issue that, at present, the generation of Certificates of Approval takes too long. Delays in the development of approvals for proposed new facilities may have a significant impact on the development of industry in Ontario"

VII. ORGANIC CHEMICALS

1. B.F.GOODRICH:

The best available technology is already in place at their plant with respect to VCM(Vinyl Chloride Monomer) emissions, with the result that raw material efficiency approaches 100%.

Some stacks would meet the deminimis level, however, they would probably not meet this low level at all times. Even though state-of-the -art technology has been installed, the ministry literature seems to indicate that if VCM is classified as LAER, further controls may be required to achieve virtually zero emissions.

Controls in service·in service at the Ontario plant are equal to, or better than, controls installed at all B.F.Goodrich plants in the U.S. and around the world. If additional controls are required on 40-50 separate emission stacks at their Ontario plant, then reg 308 would place a costly burden on them that their competitors in the U.S. and the rest of the world would not require.

B.F.Goodrich states that they are currently planning further expansion to their plant, and that they are concerned by the costs that proposed changes would involve.

2. ESSO CHEMICAL CANADA:

The MOE discussion paper proposals are often of such a conceptual nature it is often very difficult to understand precisely what is intended in the final legislation.

Each change proposed by the CAP discussion paper will result in a major impact on industry and on MOE. "Taken individually, each of these has the potential to consume large quantities of resources both in terms of capital and operating costs to industry, and manpower in industry and MOE. Taken together and simultaneously, we feel that they will result in an overall unmanageable burden in both manpower and capital costs".

"The proposal to control all stationary emission sources to the air at the bottom of the stack is the one with the most significant cost implications". A regulation which forces the application of technology because it is available, without reference to cost-benefit, would result in a massive and non-productive use of capital funds.

The cost of reaching LAER is high, and this category should be reserved for chemicals that truly fit into it.

The models proposed are too complex and extremely time consuming to run.

Monitoring requirements should be determined on a plant by plant basis. The MOE should recognize that on-line analyzers are expensive to install and operate because of high maintenance requirements.

3. DUPONT CANADA:

Dupont has considerable activity aimed at developing technology for new processes and products. This maintains and enhances their competitive position. In many cases, this requires experimental trials on plant equipment. In the past their programs have been delayed because of the time required to obtain approvals. They fear that this will worsen if the role of Certificates of Approvals is expanded.

4. NOVACOR:

They simply endorse the submission of the Lambton Industrial society, of which they are a member.

5. LAMBTON INDUSTRIAL SOCIETY:

"Many important features of the paper proposals still cannot be analyzed in depth until various parts of the proposals become more defined."

"Best emission control available" does not consider economic factors or the proven reliability of the technology. "This could lead to a requirement to use experimental, unproven, unreliable and impractical emission control systems"

"Economic factors must be considered at all levels to allow industries to be competitive in a free and frequently world scale marketplace. In particular, these factors must be recognized when retrofitting controls into an existing plant which could be more costly than in a new plant."

Lambton Industrial Society also suggests that in the setting of emission rates, the frequency of emission rates should also be considered. (so for example, that emissions which occur only infrequently do not require high costly controls)

"The discussion paper proposes applying emission control schemes to all discharges. This ignores the fact that some contaminants may not be a concern in some areas, where ambient air quality for that contaminant is already excellent. In such areas, for contaminants which are not a concern for long range transport, additional controls should not be required."

"The complexity of the models may result in the need for significant resources and expenditures in the preparation of applications. There is concern that new industry and economic growth in this area may be limited because of the uncertainty, difficulties and expense associated with obtaining Certificates of Approval."

6. POLYSAR:

Polysar estimates that the retrofitting cost for their Ontario plants will be 40-65 $million. Polysar believes that there are no immediate environmental benefits obvious form these changes. Environmental protection should not be at the expense of economic growth.

The requirements for a Certificate of Approval must be clearly spelled out so that industry can submit an "information package that has a high probability of being granted a Certificate of Approval in a reasonably short time. Undue delays at this stage can kill a project because of lost markets, inflationary costs, missed deadlines and penalties in delayed equipment deliveries".

7. CANADIAN CHEMICAL PRODUCERS ASSOCIATION:

"It is important that commitments to specific action plans should not be made until cost-effectiveness studies of all reasonable alternatives are complete."

"Our main concern is that there should be a reasonable basis for the safety factors built into the maximum emission rates. A very high cost may be built into the steps required to achieve the last increment of risk reduction".

"We are very concerned with the problem of compliance with the 24-hour to 1-hour standards so it is not normally necessary to run the hourly meteorological model to obtain the averaged 24-hour data on a year's meteorological conditions for a variety of emitted substances. The cost would be almost prohibitive".

It is important that response to Certificates of Approval applications be prompt to avoid delays and increased costs and to maintain competitiveness of Ontario industry.

"For new facilities emitting Class 1 substances, the discussion paper proposes that the construction process be halted until the Ministry has reviewed the control technology in light of the new regulation. In many cases, this would lead to unnecessary and costly delays and lost employment opportunities".

8. DOW CHEMICAL CANADA

"We foresee that implementing a modelling program that requires inclusion of emission sources beyond jurisdiction of individual companies would be unworkable.

American emissions affect our local air quality but there are no provisions in the proposals deal with this concern.

VIII. PRIVATE WASTE INCINERATION

1. TRICIL:

Tricil believes that the timing proposed is overly optimistic, given the nature of the required changes and their impact on Ontario Industry.

"In the process of introducing and implementing the proposed regulations, time must be allowed to ensure that projects now being developed can address and incorporate the new regulation standards and limits"

IX. BEVERAGE ALCOHOL

1. HIRAM WALKER AND SONS

They question the ambient air standard listed for ethanol. Many of the values listed are from outdated literature searches and should be reviewed.

The U.S. E.P.A. considered regulating emission levels of ethanol emissions from maturing warehouses and decided that regulation was not required for facilities producing beverage alcohol. E.P.A. studies indicated that either emission levels were too low to warrant regulation or there was a lack of demonstrated control technology.

2. JOSEPH E.SEAGRAM AND SONS LTD.

They also question the proposed ambient air standard for ethanol. There are no practical control systems available. Carbon absorbers have been tested, but they have a detrimental effect on the whiskey.

In the summer months, the ethanol content of warehouses rises considerably, and it is necessary to ventilate warehouses before allowing employees to enter. Ventilation is the only practical means of control available. During these ventilation occurrences, they will be in violation of reg.308.

Seagrams therefore urges the Ministry to reconsider its ambient air standard for ethanol.

X. OTHER

1. PROCTER AND GAMBLE:

Procter and Gamble wish to maintain their competitive position. They stress the importance of obtaining improvement without placing excessive economic constraints on industry.

The program proposed by CAP will create an immense work load. Staffing will have to be increased in the Industry. Procter and Gamble believes that too many issues are being addressed at once.

Lengthy delays in obtaining Certificates of Approval can lead to startup delays, which can have an effect on return on investment and possibly product introduction.

In situations where the air shed is currently overloaded, Procter and Gamble is concerned that the opportunity to introduce a new source will be affected.

2. JOHNSON MATTHEY

"In adapting elements from the U.S. experience to develop an Ontario emission control strategy, we noted several areas where the U.S. experience was either misinterpreted or not adequately explained. This has resulted in a proposed strategy for Ontario that will put Ontario companies at a severe competitive disadvantage in the world market place".

Specific clarifications concerning the U.S. experience include:

- LAER controls are required in very limited circumstances only p.165
- Similarly, BACT and NSPS apply only to major new sources and major modifications to major sources and cover a very limited number of pollutants.

They recommend that MOE evaluate the need for controls and standards for particular contaminants before burdening industry.

They urge that these new regulations apply to only major facilities:"smaller plants lack the expertise and finances to perform the stipulated analyses, evaluations of alternative control measures, and incremental financial and other aspects of each alternative.

"Rather than forcing the generation of data at the expense of already over-burdened Canadian companies, we urge the ministry to regulate based on critical known and real air pollution impacts: e.g.ozone, visibility, etc"

The proposed phase in period is unrealistically short.

Ambient air monitoring should be the responsibility of government.

3. GOODFELLOWS CONSULTING:

Immediate reporting procedures for upsets and shutdowns are an encumbrance to some industries because of the frequency of these occurrences and because of the immediate action that is required in such situations.

"Many companies that are small and that may be operated by non-technical personnel may not have the resources to prepare themselves and participate in the new regulatory requirements." They propose that MOE establish an incentive program for a year or two to encourage these companies.

MOE should not prescribe specific abatement technology to industry. Industry is most capable of determining the most applicable technology.

"The MOE should provide funding for clearly defined Research and Development Programs for the development of specific air pollution control systems and for reliable and affordable continuous monitoring equipment"

4. POLLUTECH:

Pollutech is concerned with the possible impact reg 308 may have on smaller industries. The topics they are particularly concerned about are:

- reviews of Certificates of Approval every 10 years when most equipment is based on a 20 year life
- low level emissions from small plants may be technically and financially difficult to achieve.
- the development of ambient air standards, by the small industries, could be a financially unreasonable requirement.

5. ROWAN WILLIAMS DAVIES AND IRWIN INC.

"The current stage of CAP has been too general in many regards to allow specific comments on implementation to be made".

6. CANADIAN MANUFACTURERS ASSOCIATION

There is some difficulty with the application of the models and adding the results to the expected or measured background. "For example, a plant could run the models to calculate ambient air concentrations as contributed by their proposed facility and find that, when they added the background primarily contributed by the city of Detroit, they will exceed air quality criteria...so we have a situation where a Canadian facility cannot expand or become competitive because of American pollution levels.

7. THE CANADIAN METAL COMPANY LIMITED:

"The proposed regulations will have a dramatic impact on the capital investment and operating costs of all Ontario's enterprises, whether or not a true environmental problem exists...To compound the lack of concern exhibited with regard to economic concerns, there is a degree of ultra conservatism built into the standards so that it becomes questionable wether or not any future industrial expansion can indeed be permitted in this province. The ambient air quality standards, the toxicity ratings and the modelling requirements all have a high degree of conservatism built into them so that, in combination, they can effectively strangle industrial growth." p.545

8. 3M:

The changes proposed by the discussion paper make sense on an individual basis, but as a whole are overwhelming. The requirements should be prioritized and staged for the impact to be absorbed. Ontario government and industry do not have the resources to deal with all the changes simultaneously.

Monitoring of emissions can be expensive and time consuming. Monitoring requirements should be established on a case by case basis.

"The air quality criteria appear arbitrary and inconsistent with other jurisdictions around the world".

9. ZALEV BROTHERS LIMITED:

Zalev brothers believe that the CAP as is currently proposed will have significant adverse effects on Ontario industry in Southwestern Ontario. They are concerned that industries in SOuthwestern Ontario will be found objectionable and required to reduce what minimal emissions they produce due to the emissions from Detroit. "This will affect our industries ability to compete with the U.S."

Zalev Brothers are also concerned with the proposed two stage certificate of approval. They understand that in the future it will be required to obtain a permit to build, and a permit to operate. "No one is going to spend millions of dollars to erect a plant unless they know that they can operate it on completion."

LEAR and BACT are unnecessary. "All companies are different and cannot be painted with the same brush. The Ministry should be tough, but must be flexible to recognize the practical economic realities of today's global economy".

The proposed CAP tries to do too much too soon. They believe it will lead to the destruction of industry in Ontario. " Now that Free Trade is a reality, governments must be cognizant that industry requires a level playing field in all aspects of taxation, labour and environment in order to compete effectively in North America.

10. CANADIAN ASSOCIATION OF RECYCLING INDUSTRIES:

They find the lack of cost benefit considerations in the CAP paper a grave error. Making financial viability a secondary consideration could have disastrous results.

"The only way to ensure viability under extreme air standard conditions would be for the endorsement of a level playing field between Canadian and United States competitors, with provisions for direct subsidies cost pass-through arrangements." They recommend that public education to gain support be a part of this.

They also address the problem of the "free nature" of air contaminants. They fear that recycling processors will be forced to meet standards which may already be exceeded due to emissions from other urban centres close to the U.S. border.

They believe that the recycling industry should be given special attention and understanding in light of new legislation due to the important role they play in the environment.

XI. ELECTRIC POWER GENERATION

1. ONTARIO HYDRO

Ontario Hydro has submitted an Environmental Assessment document seeking approval for scrubber technologies to meet acid gas emission limits. This program includes options to achieve cleaner air. Ontario Hydro feels that this program represents an investment in environmental protection that will achieve the results sought by MOE.

The retrofit of BACTEA for NOx and SO2 to all of Ontario Hydro's fossil fueled stations within a 5 year period is beyond the resources of Ontario Hydro and the country's air pollution engineering industry. The unit outages necessary to implement modifications could jeopardize the system's ability to meet the load.

It should be recognized if it is required to make major modifications to generating plants which are approaching the end of their useful life, this may make those plants uneconomic and result in premature shutdown. This will increase pressures to construct new generating capacity earlier. " These older plants, as they come to the end of their serviceable life, are operated on progressively lower capacity factors and, therefore, emissions become of less importance and have little impact on local air quality".

Until BACTEA has been clearly defined for each industry, it is impossible to forecast with any certainty the costs of complying with regulation 308.

For the purpose of developing cost estimates, Ontario Hydro assumes BACTEA to involve a 95% reduction in SO2 and a 80% reduction in NOx. The cumulative cost of retrofitting would be approximately 7.1 billion.

This amounts to 3 or 4 times the cost of their current program to satisfy regulation 281/87.

"It should be recognized that compliance costs would be sufficiently large to have significant impact on the Province's electricity rates and, therefore, the costs of most manufactured products."

Ontario Hydro is also concerned with the proposal to have Certificates of Approval renewed every 10 years. They feel that this will potentially double or triple their atmospheric emission control costs.

"It is clear that to undertake the proposed modelling protocols for most of Ontario Hydro's major facilities will be a lengthy and expensive process for both Ontario Hydro and MOE".

XI MINING

1. ONTARIO MINING ASSOCIATION:

The planned schedule is burdensome. Resources are currently being devoted to other initiatives such as MISA, WHMIS,etc.

XII IRON AND STEEL

1. STELCO:

"Millions of dollars have already been spent on the best equipment available for bottom of the stack controls. The proposal creates the impression that more can be done when in fact emissions are at the lowest level technology can achieve".

Stelco fears that the proposed changes will make the approvals process even more time consuming. "Delays of this nature hinder economic growth. The uncertainty introduced into business decisions would be difficult to accept for firms making a huge capital committment."

2. DOFASCO:

"It is not possible to predict, with the information we now have , the impact that these changes may have, not only on the environment but on the Ontario economy in general".

"Since 1971, Dofasco's air emissions have been reduced by approximately 90% at a cost of about $190 million. Dofasco is recognized as a leader in the North American steel industry in environmental control."

DOfasco is concerned that MOE appears to be attempting to deal with all issues simultaneously, with the same level of priority. Ontario does not have the resources or people to be able to do this effectively.

"Ontario currently has a strong but vulnerable economy. A strong economy will be required in the future to fund the massive changes that the Ministry is proposing." A main concern with the proposed CAP is that it indicates that changes may be

required in many urban areas even there are no significant toxic air quality problems. "These changes could include the shutdowns or the cancelling of any future expansion simply because an untested, theoretical model indicates that air quality criteria might be exceeded under extreme weather conditions."

The regulation should be implemented on a step by step basis to avoid placing massive restrictions on future economic growth.

"The Ministry proposes to make major changes in many different elements of the regulation at the same time. No one can predict the impact these changes will have and the potential reordering of priorities that will be necessary".

Dofasco recommends that LAER controls not be required on retrofitted operations. It is often technically impossible and ineffective to incorporate LAER technology on old operations. We should concentrate on eliminating emissions from new sources.

There are areas in Ontario (ie. Windsor and Hamilton) which exceed current criteria for agents such as particulate. This may be due to sources beyond control of industry. The Hamilton DUst study showed that in the downtown area, only 15% of air quality was due to industry. "It does not seem reasonable to prohibit the construction of modern industrial facilities where best available control technology will be incorporated simply because other levels of government or the public, in general, have not implemented the best available control technology on fugitives or non-industrial sources".

APPENDIX A

APPENDIX A: PRESENTING THE COMPLIANCE COSTS TO INDUSTRY

1. INTRODUCTION

- The costs should be calculated and presented in a way that is similar to how the individual companies would do the calculation, i.e. how the company will see the expenses.

- Net present value (NPV) will be used to summarize the overall costs, while uniform annual cost (UAC) will be used in the presentation of compliance costs as percentages of profits, production costs, etc.

2. COSTS FOR THE NPV ANALYSIS

- divided into two streams: capital and (o&m + monitoring)

- the (o&m + monitoring) stream of costs begins the year after the capital expenditure is incurred

- the capital stream will take place in one year.

3. REVENUES FOR THE NPV ANALYSIS

- The only revenues are tax liability reductions resulting from both the capital and the (o&m + monitoring) cost streams

- Tax reductions for the (o&m + monitoring) stream will be taken in the year in which the expenditures are incurred. Rate to be used for all industries: 40%.

- Tax reductions for the capital stream will be taken according to the following schedule, as determined by class 27 in the regulations of the Income Tax Act:

    - 25% in year 1, i.e. the year of incurring the expenditure
    - 50% in year 2
    - 25% in year 3.

- This accelerated tax treatment will be applied to only the capital part of the SENES figures for capital cost. INFORMETRICA has assumed that, on average, about 80% of the SENES estimates are for equipment, with the remaining 20% going to build the structure housing the equipment. We will use this ratio.

4. TIMING

- The analysis is carried out over a 15-year period. Thus, the life expectancy of the equipment is assumed to be 15 years.

5. DISCOUNT RATE

- o A discount rate of 10% will be used.

6. LIMITATIONS TO THIS ANALYSIS AND SET OF ASSUMPTIONS

The assumptions used above represent an effort to carry out an analysis which will be useful to all of the different categories of industries which have been examined in this study. However, the industries differ widely among themselves, and the circumstances of the individual companies within a sector also vary significantly. Thus, it is important to appreciate the limitations of this analysis, as summarized below.

- o The assumption of a benefit stream, i.e. reduction in tax liabilities, is only applicable in cases in which a company is paying taxes. Companies showing losses, for example, may not pay taxes, and so a reduction in tax liabilities is of little value.

- o The assumption of a 40% tax rate is a generalization. Some of the sectors consist of a mix of large and small businesses, and not all will be paying tax at the same rate. In general, the lower the tax rate, then the higher the net present value of the compliance costs because the company is receiving a lower benefit, i.e. reduction in its tax liability.

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Ontario's pollution control regulations are already among the most stringent in the world. "It seems as though we are abstracting the most demanding regulations from the standards of other countries and lumping them together...this approach to

environmental management is placing Ontario industry at a significant competitive disadvantage."

All production at the Kelsey-Hayes foundry is destined for the O.E.M. automotive market, 90% of which is directly or indirectly exported. The Ontario foundry industry is struggling to compete with foundries located in the U.S. "where it seems a more realistic approach is being taken to environmental issues".

Any change in air pollution regulation requiring major capital investment and operating expenses will probably result in the phase out of the Woodstock foundry operation, eliminating 220 jobs and threatening 300 others.

2. CANADIAN STEEL ENVIRONMENTAL ASSOCIATION:

The industry must be given sufficient time to enable self-financing of the massive funding that will be required to meet the proposed regulation.

"Several aspects of the proposal may well stifle economic growth in the province. At the very least, regulation 308 as proposed will slow industrial expansion particularly in areas that have poor ambient air quality."

The proposed changes are occurring at a time when they a faced with other costly proposals in the area of environment and occupational health and safety.

CSEA believes that industry should not be required to make changes to pollution equipment every 10 years as the costs involved would be astronomical.

III. NON-FERROUS SMELTERS

1. INCO LTD.:

Over the next few years, Inco expects to be required to spend a substantial sum of money to meet the requirements of the Countdown Acid Rain Program. Having complied with the requirements of that program they feel they may find themselves unable to meet the provisions of CAP as currently proposed and thus unable to obtain a certificate to operate.

The CAP as outlined in the discussion paper could have a serious detrimental impact on Ontario's industry and could materially impair its ability to compete.

Inco is also concerned about the complexity of the approvals associated with the proposed regulation. This complexity will inevitably result in major delays in the approval system. Further delays in granting Ministerial approvals have the potential to seriously impair the industry's competitive position. They feel that the proposed changes should be implemented on a step by step basis.

The impact of the proposed regulation cannot be assessed until the hazard ratings are made public and the levels of control technology are known.

2. FALCONBRIDGE:

Each of their locations will make individual submissions.

Falconbridge has been concentrating their efforts and expenditures to comply with regulation 660/85. They anticipate that large expenditures will be required of them to meet the 1994 requirements.

The proposed changes will be costly and will require considerable time for development.

Falconbridge's Kidd Creek copper smelter uses the most technologically advanced and environmentally sound process in the world, yet it would not meet the new regulations without extensive capital and operating expense.

3. FALCONBRIDGE'S KIDD CREEK DIVISION

"Even though we have sulphuric acid plants which have proven to be the best available technology, in order to meet requirements of the CAP discussion paper as written, Kidd would have to incur additional capital and operational expenditures exceeding 100 million dollars. To put this in perspective, this would equate to profits generated from the mining and processing of 10% of our ore reserves. Even with this expenditure it does not guarantee 100% compliance with the restrictive proposed legislation due to the inability of equipment to meet all requirements."

They are concerned with the proposed two step certificate of approvals. They do not see how they can build million dollar plants without assurance that they will be able to operate them.

4. FALCONBRIDGE: SUDBURY:

The Sudbury Falconbridge smelter could not achieve compliance within the stated time frame.

"The Smelter can achieve compliance only through major process changes, beyond the scope of conventional control equipment solutions. These processes do not yet exist and require research and development."

IV. AUTOMOTIVE INDUSTRY

1. GENERAL MOTORS OF CANADA LTD.:

MOE must keep in mind that Ontario industry is facing unprecedented competitive challenges. "By 1992, many industry analysts forecast that there will be excess capacity over 3 million units or 25% of current capacity...In order to prepare itself for this challenging environment, General Motors of CAnada has made and committed to levels of capital investments in its facilities of over $8 billion since 1980". Cost competitiveness is crucial to General Motors.

"A favourable legislative and economic environment is critical to ensuring that the automotive industry continues to be the major source of economic growth in the province". General Motors is concerned that the proposed reform of reg 308 is being undertaken without full assessment of the economic impact.

The proposed time frames for implementation is completely unrealistic, even if the industry had the necessary human and financial resources.

"Ontario industry must remain competitive. Imposing the additional burden of requiring some type of control technology for all emission sources where it is not needed is inappropriate".

The requirement to include background data in modelling calculations may impose a significant burden on them due to factors beyond their control. "In addition, in cases where companies in a neighboring jurisdiction are emitting high levels, it may be impossible for companies to expand or invest in the Ontario location because of the transient emission flows on ambient air quality". This may have a serious impact on our economy, competitiveness and employment opportunities.

General Motors objects to the renewal of certificates of approval every ten years. Equipment life span often exceeds 10 years, and it would be a great burden to have to replace control equipment every ten years.

"The proposal to require installation of continuous monitoring systems on all LAER and BACTEA sources imposes an exorbitant cost penalty on industry, particularly when the technology is not available or proven for many contaminants".

The time frame proposed for compliance may be too short.

2. MOTOR VEHICLE MANUFACTURERS ASSOCIATION:

"In our industry it is extremely difficult, if not impossible, to respond to economic impact questions without having a good understanding of the ranking of the pollutants that are to be controlled, and how their dispersion will be modelled, so that the cost appropriate control technologies can be estimated with any accuracy. In this regard, our companies are considering a technical impact study, rather than an economic one at this time." p.199

V. CEMENT INDUSTRY

1. CANADIAN PORTLAND CEMENT ASSOCIATION:

"There must be a balance between emissions control and economic growth within the Province. Industry should not be required to continually install additional control equipment simply because the technology exists, when no significant improvement in air quality is possible."

The cement industry is capital intensive. "To maintain its cost competitiveness, its plants and equipment must be fully utilized. Unfortunately, many of the Discussion Paper's options would severely penalize the industry. Potentially, it could destroy

the export market."

The discussion paper proposes limiting stack height. This will be detrimental in local, short term effects in the case of upsets.

"It would seem there is no allowance made for industrial growth, in an area which may not be attaining even one specific criterion, such as TSP...Some form of offset procedure must be developed to allow for environmentally sound economic growth. It is not practical to achieve arbitrary ambient air standards within ten Years".

"The stated objective of the ambient air (airshed) provisions is to act as a second level of screening, after the imposition of recommended source control, in order to ensure that the airshed remains in compliance with the prescribed ambient air standards." This concept leads to the greatest share of the regulatory problems. If these problems are not recognized and methods of dealing with them incorporated into the legislation, the proposed legislation will cause major disruptions to the economy.

A large part of the problem arises because the Ministry fails to fully recognize or acknowledge the existing situation in Ontario. For example, the majority of reporting sights in southwestern Ontario are presently in violation of proposed standards for suspended particulate, though sources which fall under the scope of the regulation only account for 20% of the measured value. The rest was due to urban traffic and distributed sources and background influx. "Unless these other sources are controlled, there is no prospect of meeting the recommended standard, even if industry is totally controlled or shut down."

"The proposed models are very expensive to run for a multi-source situation".."The Ontario Cement industry recommends that the Ministry review the models proposed in CAP, with due consideration to the practicality of the models and the large quantity of necessary modelling data unavailable to industry."

"Continuous opacity monitoring and annual stack tests should not be automatic requirements. Many sources do not change and controls do not deteriorate, therefore emissions remain static. Annual stack tests would be a considerable burden on the industry and more importantly, there are not sufficient resources in the Province to carry out annual tests."

"Excessive demands on stack testing resources can easily mean that routine, non substantive tests would absorb stack testers' time while 'critical path' tests in start up projects would delay the issuance of operating permits".

New ambient air standards can be burdensome to existing industries. Retro-fits to existing industries are often impossible. "To reduce kiln exhaust levels for the Ontario cement industry by 50% would be almost impossible since space is not always available for the additional equipment"

The proposed level of control may cause existing plants to be closed. The cement industry requires an extended phase-in period.

VI. PETROLEUM REFINING

1. ONTARIO PETROLEUM ASSOCIATION

The main point made by the Petroleum association was that proposed changes to Regulation 308 may result in a significant impact on the Ontario economy. The OPA believes that the current air pollution control law is effective, even though it contains some weaknesses Reforms should be carried out at a reasonable pace with full consideration of their potential impact.

2. ESSO PETROLEUM CANADA

"The Ontario petroleum industry is directly tied into the international market place. The Ministry of the Environment must recognize that significantly higher costs for emissions control in Ontario could threaten the viability of the manufacture of petroleum products in Ontario".

MOE should recognize that"control technology being added to existing facilities is often much more expensive than the same technology being built into new facilities."

"The amendments should address the issue that, at present, the generation of Certificates of Approval takes too long. Delays in the development of approvals for proposed new facilities may have a significant impact on the development of industry in Ontario"

VII. ORGANIC CHEMICALS

1. B.F.GOODRICH:

The best available technology is already in place at their plant with respect to VCM(Vinyl Chloride Monomer) emissions, with the result that raw material efficiency approaches 100%.

Some stacks would meet the deminimis level, however, they would probably not meet this low level at all times. Even though state-of-the -art technology has been installed, the ministry literature seems to indicate that if VCM is classified as LAER, further controls may be required to achieve virtually zero emissions.

Controls in service in service at the Ontario plant are equal to, or better than, controls installed at all B.F.Goodrich plants in the U.S. and around the world. If additional controls are required on 40-50 separate emission stacks at their Ontario plant, then reg 308 would place a costly burden on them that their competitors in the U.S. and the rest of the world would not require.

B.F.Goodrich states that they are currently planning further expansion to their plant, and that they are concerned by the costs that proposed changes would involve.

2. ESSO CHEMICAL CANADA:

The MOE discussion paper proposals are often of such a conceptual nature it is often very difficult to understand precisely what is intended in the final legislation.

Each change proposed by the CAP discussion paper will result in a major impact on industry and on MOE. "Taken individually, each of these has the potential to consume large quantities of resources both in terms of capital and operating costs to industry, and manpower in industry and MOE. Taken together and simultaneously, we feel that they will result in an overall unmanageable burden in both manpower and capital costs".

"The proposal to control all stationary emission sources to the air at the bottom of the stack is the one with the most significant cost implications". A regulation which forces the application of technology because it is available, without reference to cost-benefit, would result in a massive and non-productive use of capital funds.

The cost of reaching LAER is high, and this category should be reserved for chemicals that truly fit into it.

The models proposed are too complex and extremely time consuming to run.

Monitoring requirements should be determined on a plant by plant basis. The MOE should recognize that on-line analyzers are expensive to install and operate because of high maintenance requirements.

3. DUPONT CANADA:

Dupont has considerable activity aimed at developing technology for new processes and products. This maintains and enhances their competitive position. In many cases, this requires experimental trials on plant equipment. In the past their programs have been delayed because of the time required to obtain approvals. They fear that this will worsen if the role of Certificates of Approvals is expanded.

4. NOVACOR:

They simply endorse the submission of the Lambton Industrial society, of which they are a member.

5. LAMBTON INDUSTRIAL SOCIETY:

"Many important features of the paper proposals still cannot be analyzed in depth until various parts of the proposals become more defined."

"Best emission control available" does not consider economic factors or the proven reliability of the technology. "This could lead to a requirement to use experimental, unproven, unreliable and impractical emission control systems"

"Economic factors must be considered at all levels to allow industries to be competitive in a free and frequently world scale marketplace. In particular, these

factors must be recognized when retrofitting controls into an existing plant which could be more costly than in a new plant."

Lambton Industrial Society also suggests that in the setting of emission rates, the frequency of emission rates should also be considered. (so for example, that emissions which occur only infrequently do not require high costly controls)

"The discussion paper proposes applying emission control schemes to all discharges. This ignores the fact that some contaminants may not be a concern in some areas, where ambient air quality for that contaminant is already excellent. In such areas, for contaminants which are not a concern for long range transport, additional controls should not be required."

"The complexity of the models may result in the need for significant resources and expenditures in the preparation of applications. There is concern that new industry and economic growth in this area may be limited because of the uncertainty, difficulties and expense associated with obtaining Certificates of Approval."

6. POLYSAR:

Polysar estimates that the retrofitting cost for their Ontario plants will be 40-65 $million. Polysar believes that there are no immediate environmental benefits obvious form these changes. Environmental protection should not be at the expense of economic growth.

The requirements for a Certificate of Approval must be clearly spelled out so that industry can submit an "information package that has á high probability of being granted a Certificate of Approval in a reasonably short time. Undue delays at this stage can kill a project because of lost markets, inflationary costs, missed deadlines and penalties in delayed equipment deliveries".

7. CANADIAN CHEMICAL PRODUCERS ASSOCIATION:

"It is important that commitments to specific action plans should not be made until cost-effectiveness studies of all reasonable alternatives are complete."

"Our main concern is that there should be a reasonable basis for the safety factors built into the maximum emission rates. A very high cost may be built into the steps required to achieve the last increment of risk reduction".

"We are very concerned with the problem of compliance with the 24-hour to 1-hour standards so it is not normally necessary to run the hourly meteorological model to obtain the averaged 24-hour data on a year's meteorological conditions for a variety of emitted substances. The cost would be almost prohibitive".

It is important that response to Certificates of Approval applications be prompt to avoid delays and increased costs and to maintain competitiveness of Ontario industry.

"For new facilities emitting Class 1 substances, the discussion paper proposes that the construction process be halted until the Ministry has reviewed the control technology in light of the new regulation. In many cases, this would lead to

unnecessary and costly delays and lost employment opportunities".

8. DOW CHEMICAL CANADA

"We foresee that implementing a modelling program that requires inclusion of emission sources beyond jurisdiction of individual companies would be unworkable.

American emissions affect our local air quality but there are no provisions in the proposals deal with this concern.

VIII. PRIVATE WASTE INCINERATION

1. TRICIL:

Tricil believes that the timing proposed is overly optimistic, given the nature of the required changes and their impact on Ontario Industry.

"In the process of introducing and implementing the proposed regulations, time must be allowed to ensure that projects now being developed can address and incorporate the new regulation standards and limits"

IX. BEVERAGE ALCOHOL

1. HIRAM WALKER AND SONS

They question the ambient air standard listed for ethanol. Many of the values listed are from outdated literature searches and should be reviewed.

The U.S. E.P.A. considered regulating emission levels of ethanol emissions from maturing warehouses and decided that regulation was not required for facilities producing beverage alcohol. E.P.A. studies indicated that either emission levels were too low to warrant regulation or there was a lack of demonstrated control technology.

2. JOSEPH E.SEAGRAM AND SONS LTD.

They also question the proposed ambient air standard for ethanol. There are no practical control systems available. Carbon absorbers have been tested, but they have a detrimental effect on the whiskey.

In the summer months, the ethanol content of warehouses rises considerably, and it is necessary to ventilate warehouses before allowing employees to enter. Ventilation is the only practical means of control available. During these ventilation occurrences, they will be in violation of reg.308.

Seagrams therefore urges the Ministry to reconsider its ambient air standard for ethanol.

X. OTHER

1. PROCTER AND GAMBLE:

Procter and Gamble wish to maintain their competitive position. They stress the importance of obtaining improvement without placing excessive economic constraints on industry.

The program proposed by CAP will create an immense work load. Staffing will have to be increased in the Industry. Procter and Gamble believes that too many issues are being addressed at once.

Lengthy delays in obtaining Certificates of Approval can lead to startup delays, which can have an effect on return on investment and possibly product introduction.

In situations where the air shed is currently overloaded, Procter and Gamble is concerned that the opportunity to introduce a new source will be affected.

2. JOHNSON MATTHEY

"In adapting elements from the U.S. experience to develop an Ontario emission control strategy, we noted several areas where the U.S. experience was either misinterpreted or not adequately explained. This has resulted in a proposed strategy for Ontario that will put Ontario companies at a severe competitive disadvantage in the world market place".

Specific clarifications concerning the U.S. experience include:

- LAER controls are required in very limited circumstances only p.165
- Similarly, BACT and NSPS apply only to major new sources and major modifications to major sources and cover a very limited number of pollutants.

They recommend that MOE evaluate the need for controls and standards for particular contaminants before burdening industry.

They urge that these new regulations apply to only major facilities:"smaller plants lack the expertise and finances to perform the stipulated analyses, evaluations of alternative control measures, and incremental financial and other aspects of each alternative.

"Rather than forcing the generation of data at the expense of already over-burdened Canadian companies, we urge the ministry to regulate based on critical known and real air pollution impacts: e.g.ozone, visibility, etc"

The proposed phase in period is unrealistically short.

Ambient air monitoring should be the responsibility of government.

3. GOODFELLOWS CONSULTING:

Immediate reporting procedures for upsets and shutdowns are an encumbrance to some industries because of the frequency of these occurrences and because of the immediate action that is required in such situations.

"Many companies that are small and that may be operated by non-technical personnel may not have the resources to prepare themselves and participate in the new regulatory requirements." They propose that MOE establish an incentive program for a year or two to encourage these companies.

MOE should not prescribe specific abatement technology to industry. Industry is most capable of determining the most applicable technology.

"The MOE should provide funding for clearly defined Research and Development Programs for the development of specific air pollution control systems and for reliable and affordable continuous monitoring equipment"

4. POLLUTECH:

Pollutech is concerned with the possible impact reg 308 may have on smaller industries. The topics they are particularly concerned about are:

- o reviews of Certificates of Approval every 10 years when most equipment is based on a 20 year life
- o low level emissions from small plants may be technically and financially difficult to achieve.
- o the development of ambient air standards, by the small industries, could be a financially unreasonable requirement.

5. ROWAN WILLIAMS DAVIES AND IRWIN INC.

"The current stage of CAP has been too general in many regards to allow specific comments on implementation to be made".

6. CANADIAN MANUFACTURERS ASSOCIATION

There is some difficulty with the application of the models and adding the results to the expected or measured background. "For example, a plant could run the models to calculate ambient air concentrations as contributed by their proposed facility and find that, when they added the background primarily contributed by the city of Detroit, they will exceed air quality criteria...so we have a situation where a Canadian facility cannot expand or become competitive because of American pollution levels.

7. THE CANADIAN METAL COMPANY LIMITED:

"The proposed regulations will have a dramatic impact on the capital investment and operating costs of all Ontario's enterprises, whether or not a true environmental problem exists...To compound the lack of concern exhibited with regard to economic concerns, there is a degree of ultra conservatism built into the standards so that it becomes questionable wether or not any future industrial expansion can indeed be permitted in this province. The ambient air quality standards, the toxicity ratings and the modelling requirements all have a high degree of conservatism built into them so that, in combination, they can effectively strangle industrial growth." p.545

8. 3M:

The changes proposed by the discussion paper make sense on an individual basis, but as a whole are overwhelming. The requirements should be prioritized and staged for the impact to be absorbed. Ontario government and industry do not have the resources to deal with all the changes simultaneously.

Monitoring of emissions can be expensive and time consuming. Monitoring requirements should be established on a case by case basis.

"The air quality criteria appear arbitrary and inconsistent with other jurisdictions around the world".

9. ZALEV BROTHERS LIMITED:

Zalev brothers believe that the CAP as is currently proposed will have significant adverse effects on Ontario industry in Southwestern Ontario. They are concerned that industries in SOuthwestern Ontario will be found objectionable and required to reduce what minimal emissions they produce due to the emissions from Detroit. "This will affect our industries ability to compete with the U.S."

Zalev Brothers are also concerned with the proposed two stage certificate of approval. They understand that in the future it will be required to obtain a permit to build, and a permit to operate. "No one is going to spend millions of dollars to erect a plant unless they know that they can operate it on completion."

LEAR and BACT are unnecessary. "All companies are different and cannot be painted with the same brush. The Ministry should be tough, but must be flexible to recognize the practical economic realities of today's global economy".

The proposed CAP tries to do too much too soon. They believe it will lead to the destruction of industry in Ontario. " Now that Free Trade is a reality, governments must be cognizant that industry requires a level playing field in all aspects of taxation, labour and environment in order to compete effectively in North America.

10. CANADIAN ASSOCIATION OF RECYCLING INDUSTRIES:

They find the lack of cost benefit considerations in the CAP paper a grave error.

Making financial viability a secondary consideration could have disastrous results.

"The only way to ensure viability under extreme air standard conditions would be for the endorsement of a level playing field between Canadian and United States competitors, with provisions for direct subsidies cost pass-through arrangements." They recommend that public education to gain support be a part of this.

They also address the problem of the "free nature" of air contaminants. They fear that recycling processors will be forced to meet standards which may already be exceeded due to emissions from other urban centres close to the U.S. border.

They believe that the recycling industry should be given special attention and understanding in light of new legislation due to the important role they play in the environment.

XI. ELECTRIC POWER GENERATION

1. ONTARIO HYDRO

Ontario Hydro has submitted an Environmental Assessment document seeking approval for scrubber technologies to meet acid gas emission limits. This program includes options to achieve cleaner air. Ontario Hydro feels that this program represents an investment in environmental protection that will achieve the results sought by MOE.

The retrofit of BACTEA for NOx and SO2 to all of Ontario Hydro's fossil fueled stations within a 5 year period is beyond the resources of Ontario Hydro and the country's air pollution engineering industry. The unit outages necessary to implement modifications could jeopardize the system's ability to meet the load.

It should be recognized if it is required to make major modifications to generating plants which are approaching the end of their useful life, this may make those plants uneconomic and result in premature shutdown. This will increase pressures to construct new generating capacity earlier. " These older plants, as they come to the end of their serviceable life, are operated on progressively lower capacity factors and, therefore, emissions become of less importance and have little impact on local air quality".

Until BACTEA has been clearly defined for each industry, it is impossible to forecast with any certainty the costs of complying with regulation 308.

For the purpose of developing cost estimates, Ontario Hydro assumes BACTEA to involve a 95% reduction in SO2 and a 80% reduction in NOx. The cumulative cost of retrofitting would be approximately 7.1 billion.

This amounts to 3 or 4 times the cost of their current program to satisfy regulation 281/87.

"It should be recognized that compliance costs would be sufficiently large to have significant impact on the Province's electricity rates and, therefore, the costs of

most manufactured products."

Ontario Hydro is also concerned with the proposal to have Certificates of Approval renewed every 10 years. They feel that this will potentially double or triple their atmospheric emission control costs.

"It is clear that to undertake the proposed modelling protocols for most of Ontario Hydro's major facilities will be a lengthy and expensive process for both Ontario Hydro and MOE".

XI MINING

1. ONTARIO MINING ASSOCIATION:

The planned schedule is burdensome. Resources are currently being devoted to other initiatives such as MISA, WHMIS,etc.

XII IRON AND STEEL

1. STELCO:

"Millions of dollars have already been spent on the best equipment available for bottom of the stack controls. The proposal creates the impression that more can be done when in fact emissions are at the lowest level technology can achieve".

Stelco fears that the proposed changes will make the approvals process even more time consuming. "Delays of this nature hinder economic growth. The uncertainty introduced into business decisions would be difficult to accept for firms making a huge capital committment."

2. DOFASCO:

"It is not possible to predict, with the information we now have , the impact that these changes may have, not only on the environment but on the Ontario economy in general".

"Since 1971, Dofasco's air emissions have been reduced by approximately 90% at a cost of about $190 million. Dofasco is recognized as a leader in the North American steel industry in environmental control."

DOfasco is concerned that MOE appears to be attempting to deal with all issues simultaneously, with the same level of priority. Ontario does not have the resources or people to be able to do this effectively.

"Ontario currently has a strong but vulnerable economy. A strong economy will be required in the future to fund the massive changes that the Ministry is proposing." A main concern with the proposed CAP is that it indicates that changes may be

required in many urban areas even there are no significant toxic air quality problems. "These changes could include the shutdowns or the cancelling of any future expansion simply because an untested, theoretical model indicates that air quality criteria might be exceeded under extreme weather conditions."

The regulation should be implemented on a step by step basis to avoid placing massive restrictions on future economic growth.

" The Ministry proposes to make major changes in many different elements of the regulation at the same time. No one can predict the impact these changes will have and the potential reordering of priorities that will be necessary".

Dofasco recommends that LAER controls not be required on retrofitted operations. It is often technically impossible and ineffective to incorporate LAER technology on old operations. We should concentrate on eliminating emissions from new sources.

There are areas in Ontario (ie. Windsor and Hamilton) which exceed current criteria for agents such as particulate. This may be due to sources beyond control of industry. The Hamilton DUst study showed that in the downtown area, only 15% of air quality was due to industry. "It does not seem reasonable to prohibit the construction of modern industrial facilities where best available control technology will be incorporated simply because other levels of government or the public, in general, have not implemented the best available control technology on fugitives or non-industrial sources".